55-2840-233-24

TM 55-2840-233-24

TECHNICAL MANUAL

ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL

ENGINE, TURBOPROP

MODEL NUMBER	FSN NUMBER	PART NUMBER
T53-L-7	2840-894-6509	1-000-050-01
T53-L-7A	2840-102-3966	1-000-050-04
T53-L-15	2840-957-2853	1-000-100-01
T53-L-701	2840-116-7134	1-000-110-01

This copy is a reprint which includes current pages from Changes 1 through 19.

HEADQUARTERS, DEPARTMENT OF THE ARMY 27 JULY 1971

READEX FICHE best copy available

D 101.11:

WARNING PAGE

Personnel performing instructions involving operations, procedures, and practices which are included or implie in this technical manual shall observe the following instructions. Disregard of these warnings and precautionary information can cause illness, serious injury, death, or an aborted mission.

WARNING

MOTORING ENGINE

Disconnect 28 vdc power supply to ignition unit. After motoring engine, do not attempt to start engine until residual fuel has drained from combustion chamber drain valve.

WARNING

STARTING ENGINE

Danger areas around aircraft must be free of personnel, other aircraft, and all vehicles before engine is started. The high temperature and velocity of the exhaust are extremely dangerous.

WARNING

USE OF LUBRICATING OIL

Prolonged contact with lubricating oil MIL-L-23699 or MIL-L-7808 may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Saturated clothing should be removed immediately. Areas in which lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum. Lubricating oil may soften paint upon contact. If lubricating oil is spilled on painted surfaces, these surfaces should be thoroughly washed.

WARNING

CLEANING

The toxic and volatile nature of most cleaning agents requires that skin contact with, and inhalation of vapors, be avoided. Protective clothing, such as gloves, boots, coveralls, and face shields shall be worn during cleaning operations. Adequate ventilation shall be provided. Accidentally spilled acids shall be immediately treated according to prescribed remedial instructions. Flames shall not be exposed within 50 feet of cleaning areas, and firefighting and safety equipment shall be readily available to all personnel involved in cleaning operations.

WARNING

SOLVENT-IMMERSION CLEANING

If carbon-removing compound comes in contact with skin, eyes, or clothing, flush area with running water. Observe all previously indicated cleaning precautions.

URGENT

CHANGE
NO. 19

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 26 February 1987

Organizational, DS and GS Maintenance Manual
For
Engine, Shaft Turbine

Model Numbers	FSN Numbers	Part Numbers
T53-L-7	2840-894-6509	1-000-050-01
T53-L-7A	2840-102-3966	1-000-050-04
T53-L-15	2840-957-2853	1-000-100-01
T53-L-701	2840-116-7134	1-000-110-01
T53-L-701A	2840-176-9132	1-000-110-03

TM 55-2840-233-24, 27 July 1981 is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
13-1/13-2	13-1/13-2

2. Retain this sheet in front of manual for reference purposes

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
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URGENT

CHANGE }
NO. 18 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 3 November 1986

Organizational, DS and GS Maintenance Manual
For
Engine, Shaft Turbine

Model Numbers	FSN Numbers	Part Numbers
T53-L-7	2840-894-6509	1-000-050-01
T53-L-7A	2840-102-3966	1-000-050-04
T53-L-15	2840-957-2853	1-000-100-01
T53-L-701	2840-116-7134	1-000-110-01
T53-L-701A	2840-176-9132	1-000-110-03

TM 55-2840-233-24, 27 July 1981 is changed as follows:

1. The following is to be added to the publication title: Model Number T53-L-701A, FSN Number 2840-176-9132 and Part Number 1-000-110-03.

2. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
i and ii	i and ii
xi and xii	xi and xii
xviiiA/xviiiB	xviiiA/xviiiB
xxi thru xxvi	xxi thru xxvi
1-1/1-2	1-1/1-2
2-51 thru 2-53/2-54	2-51 thru 2-53/2-54
3-29 and 3-30	3-29 and 3-30
-----	3-30.1/3-30.2
3-35 and 3-36	3-35 and 3-36
3-41 and 3-42	3-41 and 3-42
4-10A and 4-10B	4-10A and 4-10B
4-19 and 4-20	4-19 and 4-20
5-19 and 5-20	5-19 and 5-20
5-21 and 5-22	5-21 and 5-22
5-39 and 5-40	5-39 and 5-40
5-55 and 5-56	5-55 and 5-56
7-9 and 7-10	7-9 and 7-10
-----	7-10.1/7-10.2
7-17 and 7-18	7-17 and 7-18
7-159 thru 7-160A/7-160B	7-159 thru 7-160B
7-165 and 7-166	7-165 and 7-166
9-15 and 9-16	9-15 and 9-16
11-29 and 11-30	11-29 and 11-30
12-3 and 12-4	12-3 and 12-4
12-7 and 12-8	12-7 and 12-8
C-1 and C-2	C-1 and C-2
-----	C-5/C-6

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TM 55-2840-233-24
C 17

CHANGE
No. 17

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 April 1982

Organizational, DS and GS Maintenance Manual
ENGINE TURBOPROP

MODEL NUMBER	NSN NUMBER	PART NUMBER
T53-L-7	2840-00-894-6509	1-000-050-01
T53-L-7A	2840-00-102-3966	1-000-050-04
T53-L-15	2840-00-957-2853	1-000-100-01
T53-L-701	2840-00-116-7134	1-000-110-01

TM 55-2840-233-24, 27 July 1971, is changed as follows:

1. Remove and insert pages as indicated below.

	Remove pages	Insert pages
Chapter 2	2-51 and 2-52	2-51 and 2-52
Chapter 5	5-39 and 5-40	5-39 and 5-40
Chapter 7	7-95 and 7-96	7-95 and 7-96
Chapter 8	8-45 and 8-46	8-45 and 8-46

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TM 55-2840-233-24
C 16

CHANGE }
No. 16 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 18 February 1982

Organizational, DS and GS Maintenance Manual

ENGINE TURBOPROP

MODEL NUMBER	NSN NUMBER	PART NUMBER
T53-L-7	2840-00-894-6509	1-000-050-01
T53-L-7A	2840-00-102-3966	1-000-050-04
T53-L-15	2840-00-957-2853	1-000-100-01
T53-L-701	2840-00-116-7134	1-000-110-01

TM 55-2840-233-24, 27 July 1971, is changed as follows:

1. Remove and insert pages as indicated below:

	Remove pages	Insert pages
Chapter 1	1-1/1-2	1-1/1-2
	1-9 and 1-10	1-9 thru 1-10A/1-10B
	1-15 and 1-16	1-15 and 1-16
Chapter 2	2-51 thru 2-53/2-54	2-51 thru 2-53/2-54
Chapter 3	3-5 and 3-6	3-5 and 3-6
	3-39 and 3-40	3-39 and 3-40
Chapter 4	4-9 thru 4-10A/4-10B	4-9 thru 4-10B
	4-17 and 4-18	4-17 and 4-18
Chapter 5	5-107 and 5-108	5-107 and 5-108
	5-119 thru 5-122	5-119 thru 5-122
Chapter 7	7-4A/7-4B	7-4A/7-4B
	7-9 and 7-10	7-9 and 7-10
	7-29 and 7-30	7-29 and 7-30
	7-55 and 7-56	7-55 and 7-56
	7-89 and 7-90	7-89 and 7-90
	7-101 thru 7-104	7-101 thru 7-104
	7-163 and 7-164	7-163 and 7-164
Chapter 8	8-37 thru 8-40	8-37 thru 8-40
	8-59 and 8-60	8-59 and 8-60
	8-67 and 8-68	8-67 and 8-68
Chapter 9	9-5 and 9-6	9-5 and 9-6
	9-11 and 9-12	9-11 thru 9-12A/9-12B
	9-15 and 9-16	9-15 and 9-16
Chapter 10	10-4A thru 10-4D	10-4A thru 10-4D
Chapter 11	11-7 and 11-8	11-7 and 11-8
	11-25 thru 11-32	11-25 thru 11-32
Chapter 12	12-1 and 12-2	12-1 and 12-2
Chapter 13	13-1/13-2	13-1/13-2
Index	Index 15 and Index 16	Index 15 and Index 16

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TM 55-2840-233-24
C 15

CHANGE

No. 15

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 28 March 1980

Organizational, DS and GS Maintenance Manual

MODEL NUMBER	NSN NUMBER	PART NUMBER
T53-L-7	2840-00-894-6509	1-000-050-01
T53-L-7A	2840-00-102-3966	1-000-050-04
T53-L-15	2840-00-957-2853	1-000-100-01
T53-L-701	2840-00-116-7134	1-000-110-01

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	Remove pages	Insert pages
Chapter 9	9-4A/9-4B	9-4A/9-4B

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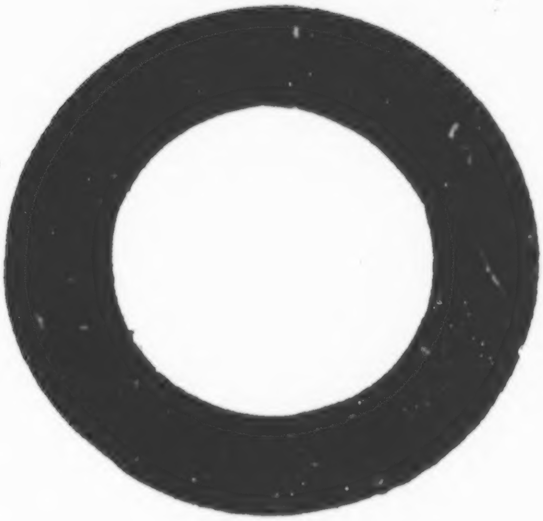

WARNING

VAPOR-BLASTING

After vapor-blasting, it may be necessary to remove remaining contaminants by hand-scrubbing with a brush. Because of the toxicity of some deposited materials, keep both part and brush wet with soap and water to prevent dust from becoming airborne.

WARNING

CHROME PICKLING

The solution used as a chrome pickle bath is poisonous. Do not allow this solution to touch the skin. Serious illness will result if the poison enters the body through cuts and bruises. Immediately remove any solution from the skin. Thoroughly wash the contacted area with soap and water.

WARNING

DEPRESSURIZING SHIPPING CONTAINER

Make certain that air pressure has been released before loosening nuts. Internal pressure could blow off cover, if nuts are removed before pressure is released.

WARNING

HANDLING LEAD-CONTAMINATED PARTS

When handling combustion chamber internal parts that have been exposed to fuels containing tetraethyl lead, ensure that the byproduct (poisonous lead oxide) is not inhaled or taken into the body through cuts or other external openings. If accidental exposure occurs, drench affected area with large amounts of clear water, and obtain immediate medical attention. Gloves and a face mask shall be worn at all times when handling contaminated parts.

WARNING

HANDLING IGNITION UNIT

The ignition unit in the T53-L-7/7A series engines contains a very small amount of radioactive material (Cesium-Barium 137) and normally requires no handling precautions. However, severely damaged units that have been broken open must be handled with forceps or gloves, and disposed of in accordance with AR-755-15 and TB 55-1500-314-25.

WARNING

REMOVING ELECTRICAL SYSTEM COMPONENTS

Before removing any component of the electrical system, ensure that all electrical power is disconnected.

CAUTION

CAPPING FUEL, OIL, AND AIR LINES AND SEALING ENGINE OPENINGS

To prevent clogging or contamination, all exposed fuel, oil, or air lines shall be capped immediately. Temporary covers shall be replaced on all exposed engine openings. Do not use tape to seal fuel or oil openings. Tape adhesive is soluble in fuel or oil and can cause contamination.

CAUTION

USE OF CADMIUM-PLATED TOOLS

Use only chrome-plated steel or unplated steel tools for the disassembly or reassembly procedures described in this manual. The use of cadmium or zinc-plated tools is not permitted since these platings are prone to chipping and flaking. Should these chips enter the engine, they may contaminate the lubrication system, ultimately clogging the filters, or produce intergranular attack on nickel or titanium base alloys at elevated temperatures.

WARNING

USE OF BROMOCHLOROMETHANE

Fire extinguishing agent bromochloromethane (CB) is a toxic, corrosive agent and dilution with water increases its corrosive effect on metal. If the engine has been subjected to CB, immediately purge the exposed engine and airframe surfaces with clean, dry air and wash with drycleaning solvent. Clean engine compressor, using drycleaning solvent method only. Avoid inhalation of CB fumes. If CB contacts skin or eyes, immediately flush with running water; then wash thoroughly with soap and water.

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Total number of pages in this manual is 892 **consisting of the following:**

Page No.	#Change No.
Title	10
A - E	13
F Blank	10
i	0
ii	9
iiA	1
iiB Blank	1
iii	1
iv	1
v	5
vi - vii	5
viii	9
ix - xi	5
xii	10
xiii	3
xiv	5
xv	4
xvi	5
xvii - xviii	10
xviiiA	10
xviiiB Blank	10
xix	9
xx	10
xxA	5
xxB Blank	5
xxi - xxii	5
xxiii - xxiv	10
xxivA	10
xxivB Blank	10
xxv	4
xxvi	9
xxvii	10
xxviii Blank	10
1-1	9
1-2 Blank	9
1-3	1
1-4 - 1-6	0
1-7	1
1-8	0
1-9 - 1-10	1
1-11 - 1-15	0
1-16	3
1-17 - 1-20	0
1-21 - 1-23	1
1-24 - 1-26	0
1-27	10
1-28 - 1-35	0
1-36	10
1-37 - 1-40	0
1-41	1
1-42 - 1-45	0
1-46 Blank	0
2-1	4
2-2 - 2-3	10
2-4	5
2-4A	4
2-4B Blank	4
2-5	4
2-6	10
2-7	0
2-8 - 2-9	10
2-10	5
2-11	0
2-12	10
2-13	9
2-14 - 2-17	10
2-18 - 2-20	4
2-20A - 2020B Deleted	4
2-21 - 2-22	4
2-23	5
2-24 - 2-31	4
2-32	10
2-33 - 2-34	4
2-34A - 2-34B Deleted	4
2-35	10
2-36 - 2-41	4
2-42	10
2-42A	9
2-42B Blank	9
2-43 - 2-44	10
2-44A	10
2-44B Blank	10
2-45	4
2-46	10
2-47	4
2-48	9
2-49	10
2–50	12
2–51	10
2–52	11
2-53	9
2-54 Blank	9
3-1	10
3-2 - 3-3	9
3-4	10
3-4A	10
3-4B Blank	10
3-5	10
3-6	9
3-6A - 3-6B Deleted	3
3-7	9
3-8 - 3-12	1
3-13	9
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3-16	5
3-17 - 3-18	0
3-19	5
3-20 - 3-21	0
3-22 - 3-23	9
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3-25	3
3-26	1
3-27	0
3-28	9
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3-30	1
3-31	0
3-32	10
3-32A	10
3-32B Blank	10
3-33	10
3-34	1
3-35	9
3-36	0
3-37	3

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Total number of pages in this manual is 892 consisting of the following:

Page No.	#Change No.
3-38	0
3-39	4
3-40	0
3-41	9
3-42	10
3-42A	9
3-42B Blank	9
3-43	10
3-44	1
3-45	0
3-46	1
3-46A	1
3-46B Blank	1
3-47	9
3-48	10
3-49	1
3-50	0
3-51	9
3-52	1
3-53	9
3-54 - 3-56	1
4-1 - 4-2	0
4-3 - 4-5	1
4-6	13
4–7 – 4–7	10
4–8	11
4-10	10
4-10A	10
4-10B Blank	10
4-11	5
4-12	3
4-13 - 4-14 Deleted	3
4-15 - 4-16	1
4-16A	10
4-16B - 4-16D	9
4-17 - 4-19	5
4-20 - 4-21	13
4-22	4
4-23	13
4–24	9
5-1	10
5-2	0
5-3	5
5-4	0
5-5 - 5-6	1
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5-6B Blank	5
5-7	1
5-8 - 5-9	0
5-10	3
5-11	0
5-12 - 5-13	5
5-14	0
5-15	1
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5-17 - 5-20	1
5-20A	1
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5-22	4
5-23 - 5-27	0
5-28 - 5-29	9
5-30	5
5-31	0
5-32	3
5-33 - 5-34	4
5-35 - 5-37	0
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5-38B Blank	10
5-39 - 5-40	9
5-40A	11
5-40B Blank	4
5-41	10
5-42 - 5-44	9
5-44A	9
5-44B Blank	9
5-45	9
5-46 - 5-48	0
5-49	13
5-50	0
5-51	10
5-52 - 5-54	5
5-54A - 5-54D	5
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5-76	1
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5–78 –5–79	0
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5-82	10
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5-89	5
5-90	4
5-91	5
5–92	13
5-93 - 5-100	0
5-101 - 5-103	5
5-104	10
5-104A	10
5-104B Blank	10
5-105 - 5-106	9
5-107 - 5-109	5
5-110	10

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Total number of pages in this manual is 892 consisting of the following:

Page No.	#Change No.
5-111 - 5-114 Deleted	5
5-115 - 5-116	1
5-117	10
5-118	1
5–119 – 5–121	13
5-122 BLANK	13
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6-8	0
6-9	10
6-10	0
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6-13	0
6-14 - 6-15	1
6-16 - 6-19	0
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6-22	1
6-23	3
6-24 - 6-39	0
6-40	1
6-41	3
6-42 - 6-44	0
6-45 - 6-46	1
7-1 - 7-2	0
7-3	10
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7-93 - 7-94	10
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7-95	5
7-96 - 7-97	1
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7-99	10
7-100	9
7-101	0
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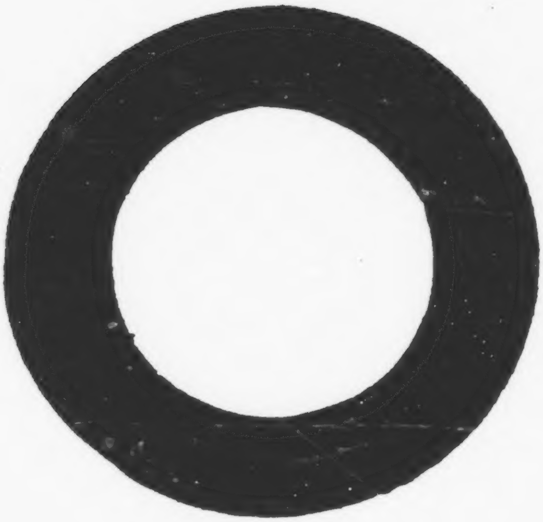


CHAPTER 1

INTRODUCTION

SECTION I

GENERAL

1-1. SCOPE.

1-2. This manual provides organizational, direct support, and general support, and general support maintenance instructions for Models T53-L-7, T53-L-7A, T53-L-15, T53-L-701 and T53-L-701A turboprop engines. Refer to table 1-1 for applicable airframe manuals. In addition to a general description of the engine, its systems, its components, and its accessories, detailed removal, disassembly, cleaning, repair and replacement, assembly, and installation procedures are also included.

NOTE

> Hereafter, wherever Model Number T53-L-701 appears the model Number T53-L-701A is applicable also, except for the compressor and compressor rotor assemblies.

1-3. FORMS AND RECORDS

1-4. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

1-5. REPORTING OF ERRORS.

1-6. Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028, Recommended Changes to DA Publications, and forwarded direct to: Commander, U.S. Army Aviation Systems Command, ATTN: AMSAV-MPSD, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798.

1-7. DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE.

NOTE

> The decision to destroy an engine shall be made by the appropriate authority.

1-8. When evacuation of an engine to safety is not possible, the engine shall be destroyed to prevent its use by the enemy. Refer to TM 750-244-1-5.

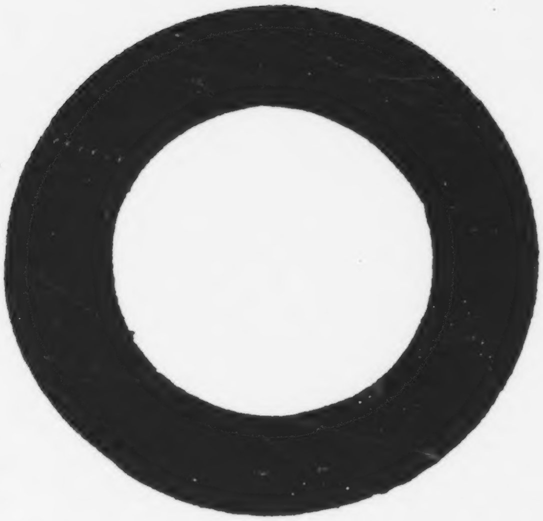
1-9. DEMOLITION OF ENGINE BY EXPLOSIVES. Whenever possible, explosives shall be used to destroy an engine. Explosives may be placed in the in the inlet and exhaust opening of the engine and detonated when personnel have withdrawn to a safe distance or to cover. Explosives may also be detonated under an engine which is stored in a shipping container.

1-10. DEMOLITION OF ENGINE USING MECHANICAL MEANS. The engine may be destroyed mechanically by smashing all cast parts. A smashed compressor housing will render the engine unusable. Other parts and accessories may be smashed or crushed as time permits. When more than one engine is to be destroyed mechanically, ensure that similar parts on each engine are destroyed.

1-11. DEMOLITION OF ENGINE BY FIRE. An incendiary grenade or any other source of intense and sustained combustion may be used to destroy the engine by fire.

Table 1-1. Applicable Airframe Manuals

ENGINE MODEL	AIRFRAME MANUAL
T53-L-7/7A	TM55-1510-204-10/3 TM55-1510-204-10/4 TM55-1510-204-23
T53-L-15	TM55-1510-204-10/4 TM55-1510-204-23
T53-L-701/701A	TM55-1510-213-10 TM55-1510-213-23



SECTION II

DESCRIPTION

1-12. GENERAL.

1-13. This section presents a brief description of the engine systems and includes principal operational features of the fuel, lubrication, electrical, internal cooling and pressurization, anti-icing, interstage air-bleed and inlet guide vane systems.

1-14. DESCRIPTION OF ENGINE. Military Model T53-L-7 (Lycoming Model LTC1F-2) engine is a turboprop engine with a single stage free-type power turbine and single stage gas producer turbine that drives a combination axial-centrifugal compressor. The engine has an external annular vaporizing-type combustor. T53-L-7 engines modified to a "long life" configuration are designated T53-L-7A and are permitted a greater interval between internal (hot end) inspections. These engines contain the following components: gas producer nozzle (1-110-030-34 or 1-110-030-36), No. 2 bearing housing (1-110-310-07), No. 2 bearing retainer (1-110-314-08), gas producer rotor (1-110-490-08), fifth stage compressor disc assembly (1-110-450-09), cast vapor seals (1-130-094-05), and combustion chamber curl (1-110-440-02). Military Models T53-L-15 and T53-L-701 (Lycoming Models LTC1F-4 and LTC1F-5) engines are turboprop engines with two stage free-type power turbines and two stage gas producer turbines that drive a combination axial-centrifugal compressor. The engines have external annular type combustors. Engine Model T53-L-701, having the letter A after the serial number, incorporates improved third (1-100-242-09) and fourth (1-100-244-08) stage compressor disc assemblies. Engine Model T53-L-15 having the letter A after the serial number incorporates improved second, third, and fourth stage compressor disc assemblies. These disc assemblies are identified by black anodize coating and as follows: second stage disc assemblies are identified by Ⓐ 1-100-710-10 or —△— 1-100-710-09 ; third stage disc assemblies by 1-100-230-07; and fourth stage disc assemblies by 1-100-240-10.

CAUTION

In order to maintain the T53-L-7A "long life" configuration and extended inspection interval, any replacement for a component listed above must be of the same part number. The incorporation of any other part number component reverts the engine to a normal inspection interval.

1-15. DIRECTIONAL REFERENCES. (See figure 1-1.) The following directional references are used in this manual:

a. FRONT - End of engine from which output power is extracted.

b. REAR - End of engine from which exhaust gases are expelled.

c. RIGHT AND LEFT - Determined by observing engine from exhaust end.

d. BOTTOM - Determined by location of accessory drive gearbox assembly.

e. TOP - Directly opposite, or 180 degrees from, accessory drive gearbox assembly. (The hot-air solenoid valve is at top of engine.)

f. DIRECTION OF ROTATION - Determined as viewed from rear of engine. Direction of rotation of compressor rotor and gas producer turbine is counterclockwise. The power turbines and power output gearshaft rotate clockwise.

g. O'CLOCK - Position expressed as viewed from rear of engine.

1-16. DESCRIPTION OF ENGINE MAJOR ASSEMBLIES. (See figures 1-2 through 1-4.)

1-17. Major assemblies of the engine are inlet housing assembly, reduction gear assembly, overspeed governor and tachometer drive assembly, accessory drive gearbox assembly, compressor and impeller housing assemblies, compressor rotor assembly, diffuser housing, and combustor turbine assembly.

1-18. INLET HOUSING ASSEMBLY. (See figures 1-2 through 1-4.) The inlet housing assembly (6) is divided into two principal areas. The outer housing, supported by air struts, forms the outer wall of air inlet area, and houses the deicing manifold. The inner housing forms the inner wall of air inlet area.

a. On the T53-L-7/7A/15 engines, the inlet housing assembly encloses the reduction gear assembly (1), which includes propeller reduction internal gear. Also included in inlet housing assembly are accessory drive carrier assembly (4), torquemeter section, propeller shaft rear bearing support assembly (3), and No. 1 main bearing.

b. On the L-701 engine, the inlet housing assembly encloses the primary propeller reduction gear assembly, secondary carrier assembly and primary and secondary sun gears. The torquemeter electric wiring and torquemeter head assembly are also mounted within inlet housing.

c. The accessory drive gearbox assembly (7) is mounted on the bottom of inlet housing. The overspeed governor and tachometer drive assembly (5) is mounted on the exterior left side of inlet housing. The power takeoff pad is located on the upper right side of inlet housing.

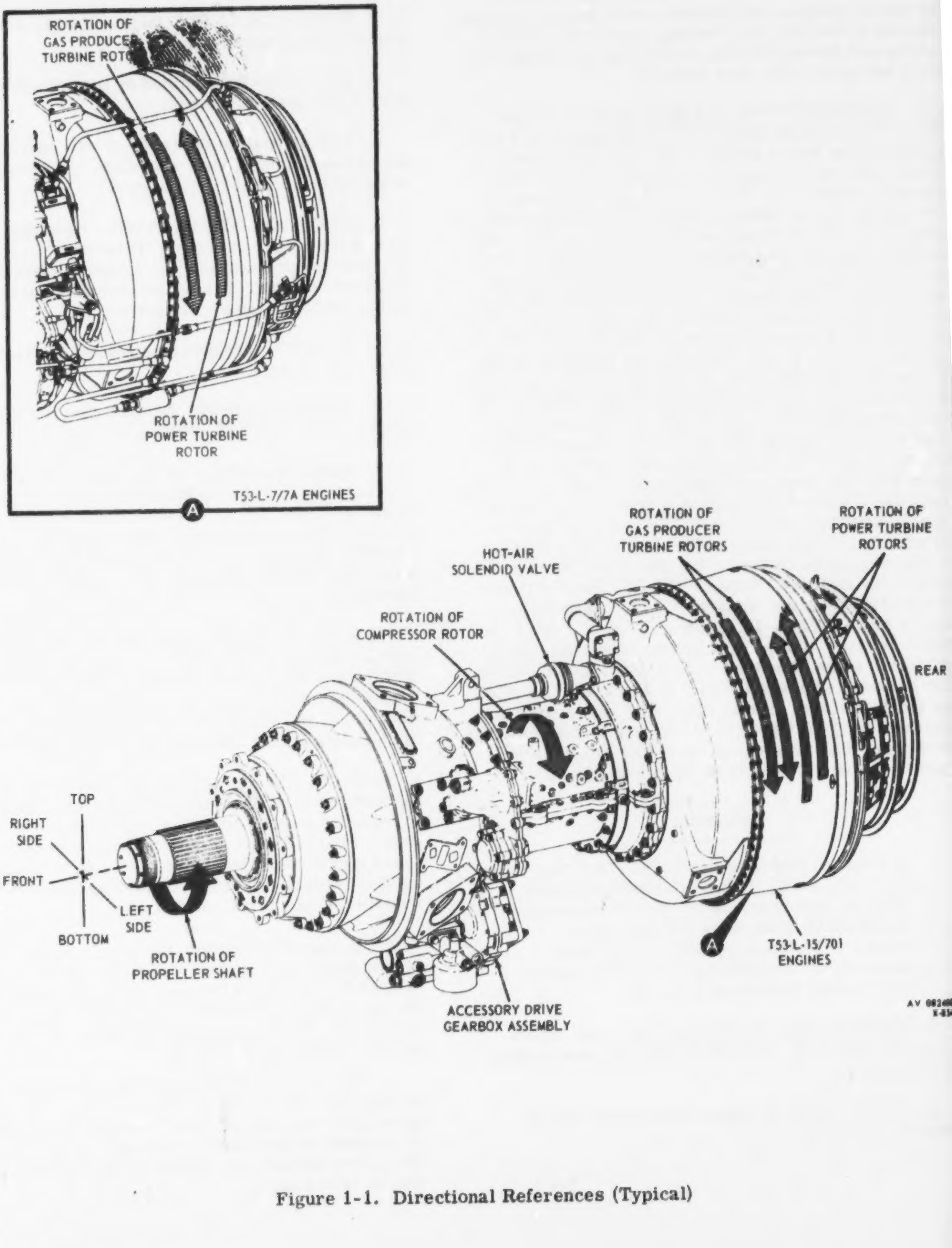
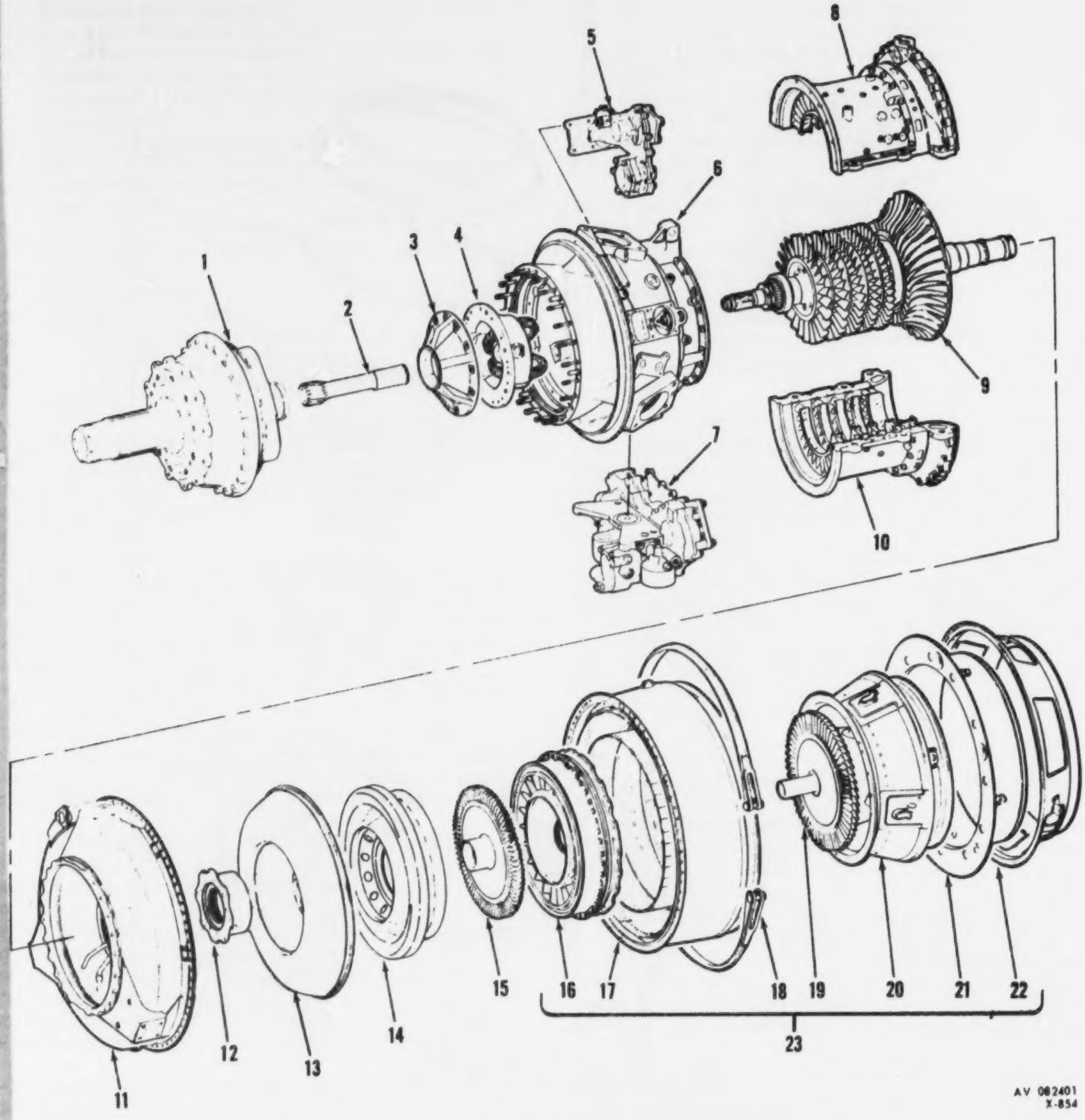

ROTATION OF
GAS PRODUCER
TURBINE ROTOR
ROTATION OF
POWER TURBINE
ROTOR
T53-L-7/7A ENGINES
A
ROTATION OF
GAS PRODUCER
TURBINE ROTORS
ROTATION OF
POWER TURBINE
ROTORS
HOT-AIR
SOLENOID VALVE
ROTATION OF
COMPRESSOR ROTOR
REAR
TOP
RIGHT
SIDE
FRONT
LEFT
SIDE
BOTTOM
ROTATION OF
PROPELLER SHAFT
A
T53-L-15/701
ENGINES
ACCESSORY DRIVE
GEARBOX ASSEMBLY

Figure 1-1. Directional References (Typical)



1. Reduction Gear Assembly
2. Propeller Reduction Sun Gear
3. Propeller Shaft Rear Bearing Support Assembly
4. Accessory Drive Carrier Assembly
5. Overspeed Governor and Tachometer Drive Assembly
6. Inlet Housing Assembly
7. Accessory Drive Gearbox Assembly
8. Compressor and Impeller Housing Assemblies Upper Half
9. Compressor Rotor Assembly
0. Compressor and Impeller Housing Assemblies Lower Half
11. Diffuser Housing
12. Rear Bearing Housing
13. Combustion Chamber Deflector
14. First Stage Turbine Nozzle and Flange Assembly
15. First Stage Turbine Rotor
16. Power Turbine Nozzle and Cylinder Assembly
17. Combustion Chamber Assembly
18. V-Band and Assembly
19. Second Stage Turbine Rotor Assembly
20. Exhaust Diffuser
21. Fire Shield Assembly
22. Support Cone Assembly
23. Combustor Turbine Assembly

Figure 1-2. Engine Major Assemblies (T53-L-7/7A)

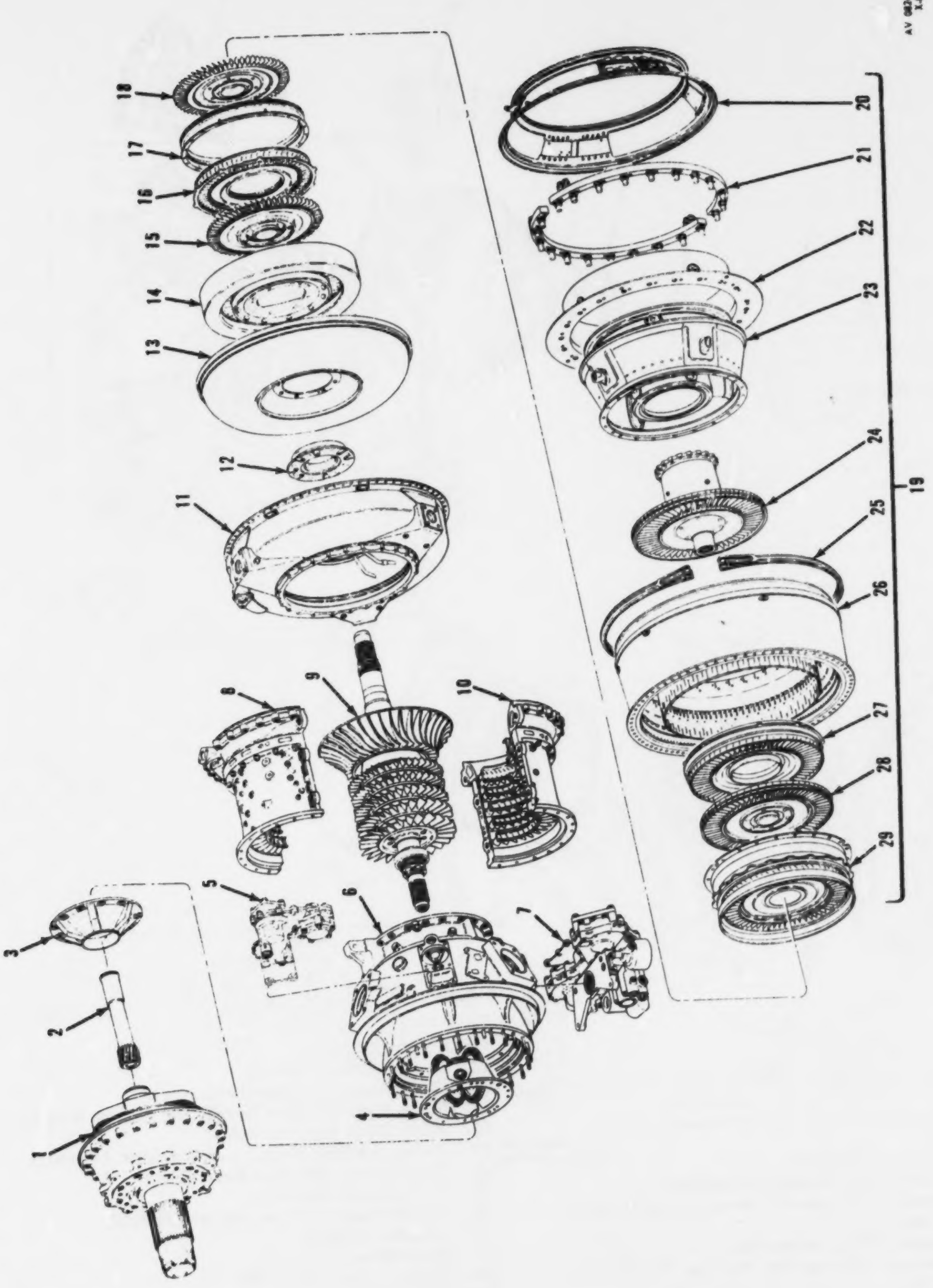

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Figure 1-3. Engine Major Assemblies (T53-L-15)

Key to Figure 1-3.

1. Reduction Gear Assembly
2. Propeller Reduction Sun Gear
3. Propeller Shaft Rear Bearing Support Assembly
4. Accessory Drive Carrier Assembly
5. Overspeed Governor and Tachometer Drive Assembly
6. Inlet Housing Assembly
7. Accessory Drive Gearbox Assembly
8. Compressor and Impeller Housing Assemblies Upper Half
9. Compressor Rotor Assembly
10. Compressor and Impeller Housing Assemblies Lower Half
11. Diffuser Housing
12. Rear Bearing Housing
13. Combustion Chamber Deflector
14. First Stage Gas Producer Nozzle
15. First Stage Gas Producer Turbine Rotor Assembly
16. Second Stage Gas Producer Nozzle
17. Second Stage Gas Producer Cylinder
18. Second Stage Gas Producer Turbine Rotor Assembly
19. Combustor Turbine Assembly
20. Exhaust Diffuser Support Cone Assembly
21. Main Fuel Manifold Assembly
22. Fire Shield Assembly
23. Exhaust Diffuser Assembly
24. Power Turbine Rotor and Bearing Housing Assembly
25. V-Band Coupling
26. Combustion Chamber Assembly
27. Second Stage Power Turbine Nozzle
28. First Stage Power Turbine Rotor
29. First Stage Power Turbine Assembly

1-19. OVERSPEED GOVERNOR AND TACHOMETER DRIVE ASSEMBLY. (See figures 1-2 through 1-4.) The overspeed governor and tachometer drive assembly (5) drives the power turbine tachometer generator and topping governor. The tachometer generator gives cockpit panel indication of speed, while the topping governor, in conjunction with the fuel control, maintains power turbine speed within permissible limits. On T53-L-7/7A/15 engines, the rotary (booster) pump is mounted on and driven by the overspeed governor and tachometer drive assembly. The assembly is mounted at the 9-o'clock position on the exterior of inlet housing. The assembly is driven through shafts and gearing from a spur gear on the power shaft assembly. On the T53-L-701 engine, the junction box for the electric torquemeter is mounted on overspeed governor and tachometer drive assembly.

1-20. ACCESSORY DRIVE GEARBOX ASSEMBLY. (See figures 1-2 through 1-4.) The accessory drive gearbox assembly (7) is mounted at the 6-o'clock position on the exterior of the inlet housing. It is driven through a shaft and gearing from the compressor forward shaft. Mounted on the gearbox are the power-driven rotary (oil) pump, oil filter, fuel control, compressor rotor N1 tachometer generator, and starter-generator. A chip-detector drain plug is installed in the bottom of the gearbox.

1-21. REDUCTION GEAR ASSEMBLY (T53-L-7/7A/15 Engines). (See figures 1-2 and 1-3.) The reduction gear assembly (1), mounted at the front of inlet housing, consists of front bearing support, propeller shaft and planet gear carrier, three planet gear assemblies, and propeller internal reduction gear.

a. The reduction gear assembly is driven by the propeller reduction sun gear (2), which is splined to the power shaft. The three planet gears are driven by the sun gear.

b. The planet gears mesh with the propeller reduction internal gear to drive the propeller shaft. The torquemeter plate assembly is secured between the front bearing support and inlet housing.

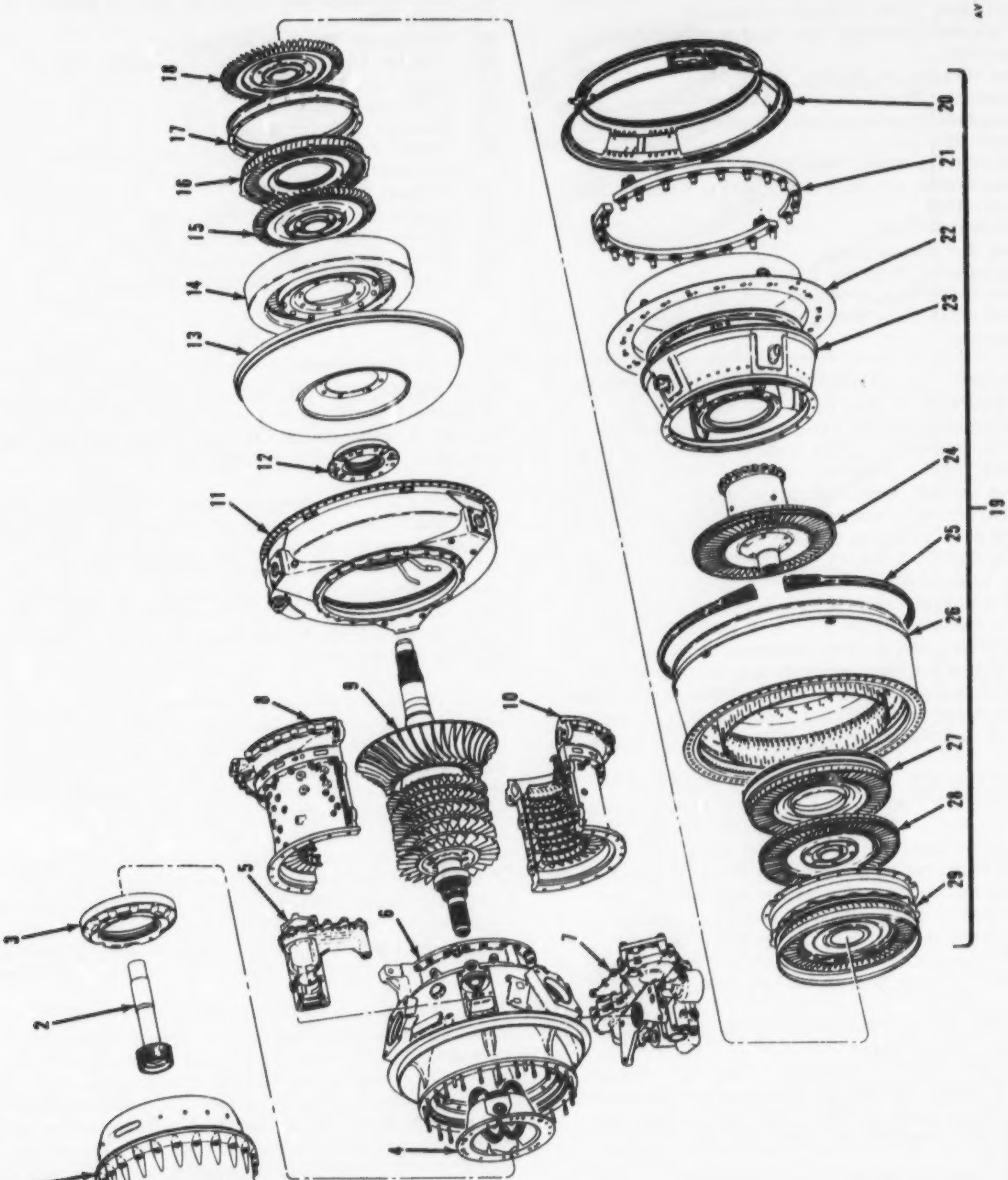
1-22. REDUCTION GEAR ASSEMBLY (T53-L-701 Engines). (See figure 1-4.) The reduction gear assembly (1), mounted at the front of the inlet housing, is a split power reduction system.

a. The primary carrier rotates with the propeller shaft and contains four identical primary planet gears. These gears are driven by the primary sun gear (2) which is splined to the power shaft. The propeller shaft (and primary carrier) assembly is supported by a ball bearing in the front support assembly and by a roller bearing in the rear, aft of the reduction gearing second stage.

b. The secondary carrier assembly, fixed in the inlet housing gear case, contains a sun gear, driven by the primary ring gear, which drives six identical planetary gears spaced uniformly around the common axis. The planetary gears drive the secondary ring, which is splined to the propeller shaft.

c. The ring gear of the primary planetary gear set is splined to the sun gear of the secondary set. The propeller shaft is driven both by the secondary planet gears acting on the secondary stage output ring gear, and by the rotational force imparted to the propeller shaft through the mountings of the primary stage gears.

1-23. COMPRESSOR AND IMPELLER HOUSING ASSEMBLIES. (See figures 1-2 through 1-4.) The compressor and impeller housing assemblies (8 and 10) each consist of two halves. The housings enclose the compressor rotor assembly (9). The compressor stator vane assemblies and steel inserts are bolted to the compressor housing halves. The rear of the compressor housing is machined to accommodate the bleed band, which covers airbleed holes through the housing. An airbleed connecting manifold provides a flow path for bleed air from the diffuser housing to the bleed air adapter assembly, located on a port in the upper half of the impeller housing. Customer air is available from this adapter assembly, which also directs anti-icing air through a port in the impeller housing. An interstage bleed actuator assembly is mounted on the right side of the impeller housing. ■



Key to Figure 1-4.

1. Reduction Gear Assembly
2. Primary Sun Gear Assembly
3. Rear Bearing Support Assembly
4. Accessory Drive Carrier Assembly
5. Overspeed Governor and Tachometer Drive Assembly
6. Inlet Housing Assembly
7. Accessory Drive Gearbox Assembly
8. Compressor and Impeller Housing Assemblies Upper Half
9. Compressor Rotor Assembly
10. Compressor and Impeller Housing Assemblies Lower Half
11. Diffuser Housing
12. Rear Bearing Housing
13. Combustion Chamber Deflector
14. First Stage Gas Producer Nozzle
15. First Stage Gas Producer Turbine Rotor Assembly
16. Second Stage Gas Producer Nozzle
17. Second Stage Gas Producer Cylinder
18. Second Stage Gas Producer Turbine Rotor Assembly
19. Combustor Turbine Assembly
20. Exhaust Diffuser Support Cone Assembly
21. Main Fuel Manifold Assembly
22. Fire Shield Assembly
23. Exhaust Diffuser Assembly
24. Power Turbine Rotor and Bearing Housing Assembly
25. V-Band Coupling
26. Combustion Chamber Assembly
27. Second Stage Power Turbine Nozzle
28. First Stage Power Turbine Rotor
29. First Stage Power Turbine Nozzle

1-24. COMPRESSOR ROTOR ASSEMBLY. (See figures 1-2 through 1-4.) The compressor rotor assembly (9) consists of five compressor rotor disc assemblies, five spacers, and one centrifugal compressor impeller assembly, all retained upon the compressor rotor sleeve. The gas producer turbine rotor assemblies (15, figure 1-2; 15 and 18, figures 1-3 and 1-4) are mounted on the rear shaft of the compressor rotor assembly. The compressor rotor assembly encloses, but is not connected to, the power shaft.

1-25. DIFFUSER HOUSING ASSEMBLY. (See figures 1-2 through 1-4.) The diffuser housing (11) conducts air from the compressor to the combustion chamber.

a. On T53-L-7/7A engines, the diffuser housing supports rear bearing housing (12, figure 1-2), combustion chamber deflector (13), first stage turbine nozzle and flange assembly (14), and first stage turbine rotor (15).

b. On T53-L-15/701 engines, the diffuser housing supports rear bearing housing (12, figures 1-3 and 1-4), combustion chamber deflector (13), first stage gas producer nozzle (14), second stage gas producer nozzle (16), and second stage gas producer cylinder (17). Air is bled through holes in aft face of certain diffuser vanes, through a connecting manifold, to supply anti-icing and customer bleed air.

1-26. COMBUSTOR TURBINE ASSEMBLY (T53-L-7/7A Engines). (See figure 1-2.) The combustor turbine assembly (23, figure 1-2) consists of the combustion chamber assembly (17), power turbine nozzle and cylinder assembly (16), second stage turbine support, V-band assembly (18), fire shield assembly (21), and support cone assembly (22). The combustion chamber assembly consists of the combustion chamber housing, combustion chamber liner, and fuel vaporizers. The second stage turbine support is made up of the second stage turbine rotor assembly (19) and exhaust diffuser (20). The second stage turbine rotor assembly consists of second stage turbine disc and blades, No. 3 and 4 bearings, and No. 3 bearing seal. The welded exhaust diffuser contains hollow struts through which cooling air is supplied to No. 3 and 4 bearing housing, and rear face of second stage turbine disc.

1-27. COMBUSTOR TURBINE ASSEMBLY (T53-L-15/701 Engines). (See figures 1-3 and 1-4.) The combustor turbine assembly (19) consists of exhaust diffuser support cone assembly (20), main fuel manifold assembly (21), fire shield assembly (22), exhaust assembly (23), power turbine rotor and bearing housing assembly (24), V-band coupling (25), combustion chamber assembly (26), second stage power turbine nozzle (27), first stage power turbine rotor (28), and first stage power turbine nozzle (29). The power turbine rotor and bearing housing assembly consists of the second stage power turbine rotor, No. 3 and 4 bearings, No. 3 bearing seal, and No. 3 and 4 bearing housing. The exhaust diffuser contains hollow struts through which cooling air is supplied to No. 3 and 4 bearing housing and rear face of second power turbine disc. The combustion chamber assembly (26) consists of combustion chamber liner and combustion chamber housing.

1-28. PIPING AND ACCESSORIES. Piping and accessories include the following:

a. Pressure and scavenge oil hoses and tubing

b. Power-driven rotary (oil) pump

c. Lube oil filter

d. Lubrication pressure manifold

e. Power-driven rotary (booster) pump (T53-L-7/7A/15)

f. Hot-air solenoid valve and anti-icing components

g. Starting and main fuel hoses

h. Starting fuel solenoid valve

i. Starting fuel manifold

j. Main fuel manifold

k. Starting fuel nozzles

l. Starting fuel check filter valve (T53-L-15/701)

m. Flow divider assembly hoses (T53-L-15/701)

n. Flow divider and dump valve (T53-L-15/701)

o. Fuel heater

p. Fuel filter

q. Bypass fuel filter (T53-L-7/7A)

r. Combustion chamber drain valve

s. Fuel control

t. Inlet air pressure-sensing hose

u. Electrical cable assembly

v. Ignition unit

w. Ignition lead and coil assembly

x. Igniter plugs

y. Oil temperature bulb

z. Exhaust thermocouple assembly

aa. Chip detector

ab. Interstage bleed actuator hose

ac. Inlet guide vane actuator and hoses (T53-L-15/701)

ad. Clamps, brackets, screws, and other attaching parts

ae. Power turbine rear bearing cover (T53-L-7/7A)

af. Exhaust diffuser cover

ag. Electrical torquemeter junction box (T53-L-701).

1-29. PRINCIPLES OF OPERATION.

1-30. Air enters through passages in the inlet housing and is directed into the compressor section by the inlet guide vane. Air compressed by the five stage axial compressor rotor assembly and the centrifugal compressor impeller flows through the diffuser housing and into the combustion chamber where a portion of it mixes with fuel to form a combustible mixture. Combustion occurs and the expanding gases are discharged through the turbines and exhaust diffuser. Energy is extracted from the gases by two separate and independent sets of turbines (gas producer and power). The gas producer turbine(s) drives the compressor rotor which compresses the air. The power turbine(s) supplies the driving force for the propeller shaft through reduction gearing. Internal air and gas flow is shown in figures 1-5 and 1-6.

1-31. OPERATIONAL DESCRIPTION.

1-32. The following paragraphs present a brief description of engine operation.

a. The engine is started by energizing the starter, starting fuel solenoid valve, and ignition. Starting fuel, flowing into the combustion chamber through the starting fuel nozzles (two on T53-L-7/7A or four on T53-L-15/701 engines), is ignited by the igniter plugs. Two igniter plugs are located adjacent to the starting fuel nozzles at the 4- and 8- o'clock positions in combustion chamber on the T53-L-7/7A, and the 2-, 4-, 8-, and 10- o'clock positions on the T53-L-15/701 engines. At approximately 10 percent N1 speed, the fuel regulator foot valve opens, and main fuel flows into the combustion chamber through 11 fuel vaporizers on T53-L-7/7A engines, or through 22 fuel nozzles on T53-L-15/701 engines, and is ignited by the burning starting fuel.

b. Compressor rotor speed (N1) increases as additional fuel mixes with compressed air and burns. When compressor rotor speed increases sufficiently, the starter, starting fuel solenoid valve, and ignition are deenergized.

c. Combustion gases pass through the gas producer nozzle(s) and impinge upon blades of the gas producer rotor(s); then pass through the power turbine nozzle(s) and onto blades of power turbine rotor(s). Approximately two-thirds of the gas energy passing from combustion chamber is extracted by the gas producer(s) to drive the compressor rotor assembly. The remaining energy is extracted by the power turbine(s) to drive the power shaft.

1-33. LEADING PARTICULARS.

1-34. Engine leading particulars are listed in tables 1-2 through 1-4.

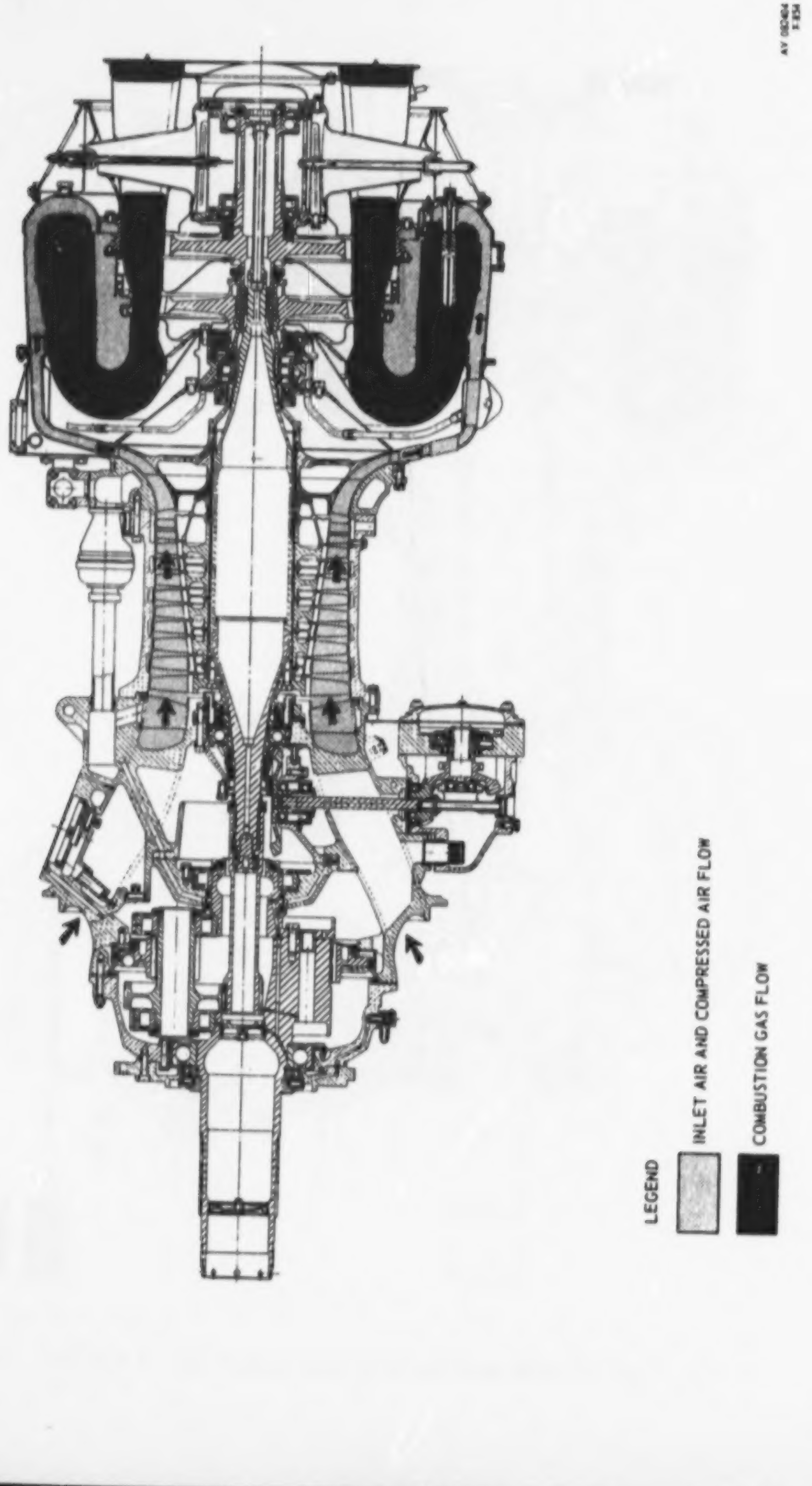
1-35. DESCRIPTION OF ENGINE SYSTEMS.

1-36. STARTING FUEL SYSTEM (T53-L-7/7A Engines). During engine start, the starting fuel system delivers starting fuel to the combustion chamber. Actuating the primer fuel switch opens the starting fuel solenoid valve, allowing scheduled fuel from the fuel control to flow through the starting fuel manifold, two starting fuel nozzles, and into the combustion chamber where it is ignited by two igniter plugs. When N1 reaches sufficient speed, the ignition system is deenergized, causing the solenoid valve to close and stop the flow of starting fuel. The starting fuel nozzles are self-purging and automatically remove excess fuel. The engine has an alternate unmetered port on the fuel control to which the starting fuel line is connected when using JP-5 fuel.

1-37. Starting Fuel Solenoid Valve. (See figure 1-7.) Fuel passing through the fuel control is metered and flows to the starting and main discharge ports. Starting fuel flows to the starting fuel solenoid valve. The solenoid valve is mounted on a bracket secured to the impeller housing rear flange at the 9-o'clock position. When the solenoid is energized, the valve opens, allowing starting fuel to flow to starting fuel nozzles. The solenoid valve is wired in conjunction with the ignition system. When sustained combustion is achieved (23 to 28 percent N1 speed), the starting fuel solenoid valve is deenergized, and the flow of starting fuel is shut off.

1-38. Starting Fuel Manifold. (See figure 1-7.) The starting fuel manifold assembly is bracketed to the main fuel manifold and mounted at rear of the combustion chamber housing. The starting fuel manifold receives fuel from the fuel control, through the starting fuel solenoid valve, and delivers it to the two starting fuel nozzles.

1-39. Starting Fuel Nozzles. Two starting fuel nozzles in the rear of the combustion chamber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INLET AIR AND COMPRESSED AIR FLOW
COMBUSTION GAS FLOW

Figure 1-5. Internal Air and Gas Flow (T53-L-7/7A)

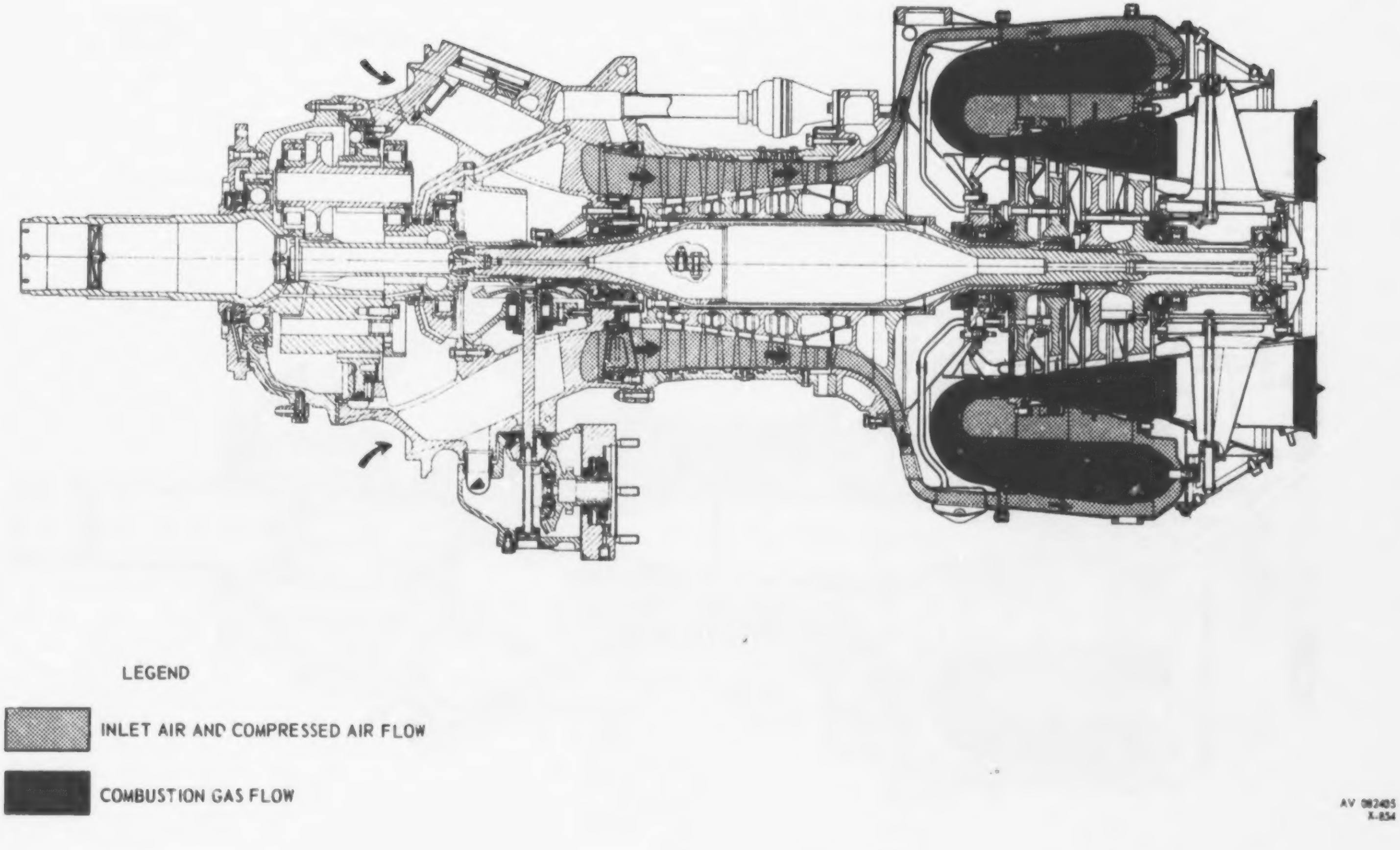
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Figure 1-6. Internal Air and Gas Flow (T53-L-15/701) (Typical)

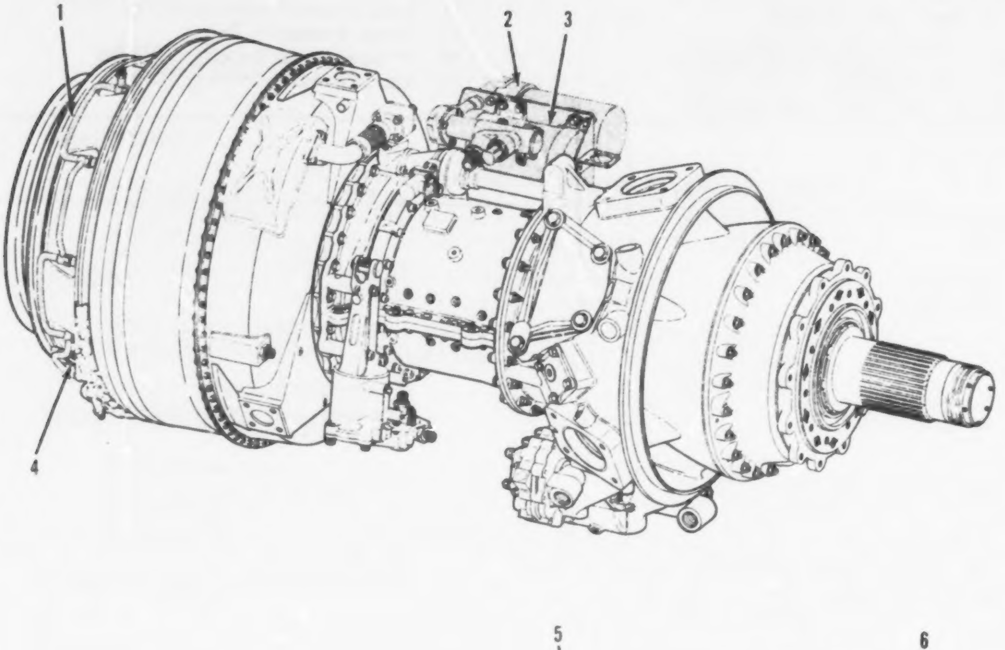
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Figure 1-7. Fuel System External Components (T53-L-7/7A)

Key to Figure 1-7.

1. Right Main Fuel Manifold
2. Fuel Filter
3. Fuel Heater
4. Starting Fuel Manifold Assembly
5. Fuel Filter Pressure Switch
6. Left Main Fuel Manifold
7. Left Starting Fuel Nozzle
8. Starting Fuel Hose Assembly
9. Bypass Fuel Filter
10. Starting Fuel Solenoid Valve
11. Condition Lever
12. Topping Governor
13. Fuel Regulator
14. Power Lever
15. Main Pressure Regulating Valve
16. Fuel Control Solenoid Valve
17. Boost Pressure Tap
18. Temperature-Sensing Element
19. Air Pressure-Sensing Hose

Table 1-2. Engine Leading Particulars (T53-L-7/7A)

MODELS	
Military	T53-L-7/7A
Lycoming	LTC1F-2
TYPE	
Application	Fixed-wing aircraft
Mounting Points	Minimum of 3 required for installation
DIMENSIONS	
Overall Length	58.400 inches
Maximum Nominal Diameter	23.000 inches
Maximum Radius	13.311 inches
WEIGHT	
Specification Weight (Dry)	555 pounds
Estimated Weight of Residual Fluids	Oil - 5 pounds Fuel - 4 pounds
ROTATIONAL DIRECTIONS	
Compressor Rotor	Counterclockwise
First Stage Turbine	Counterclockwise
Second Stage Turbine	Clockwise
Propeller Shaft	Clockwise
TYPE FUEL PRIMARY (Specified)	MIL-T-5624 (Grade JP4 or JP5)
TYPE OIL	MIL-L-23699 or MIL-L-7808
MISCELLANEOUS	
Combustion Chamber	External Annular
Reduction Gear Ratio	12.40 to 1
Compressor Ratio	6 to 1
Altitude (Absolute)	25,000 Feet Minimum (at 1.0 ram pressure ratio)
Operating Temperature Range	-54° to 38°C (-65° to 100°F)

Table 1-3. Engine Leading Particulars (T53-L-15)

MODEL	
Military	T53-L-15
Lycoming	LTC1F-4
TYPE	
Application	Fixed Wing Aircraft
Mounting Points	Minimum of 3 Required for Installation
DIMENSIONS	
Overall Length	58.377 inches
Maximum Nominal Diameter	24.360 inches
Maximum Radius	12.180 inches
WEIGHT	
Specification Weight (Dry)	605 pounds
Estimated Weight of Residual Fluids	Oil - 5 pounds Fuel - 4 pounds
ROTATIONAL DIRECTIONS	
Compressor Rotor	Counterclockwise
Gas Producer Turbines	Counterclockwise
Power Turbines	Clockwise
Propeller Shaft	Clockwise
TYPE FUEL (Specified)	MIL-T-5624 (Grade JP-4 or JP-5), MIL-F-46005 (CITE)
TYPE OIL	MIL-L-23699 or MIL-L-7808
MISCELLANEOUS	
Combustion Chamber	External Annular
Reduction Gear Ratio	12.40 to 1
Compressor Ratio	7 to 1
Altitude (Absolute)	25,000 Feet Minimum (at 1.0 ram pressure ratio)
Operating Temperature Range	-54° to 57°C (-65° to 135°F)

Table 1-4. Engine Leading Particulars (T53-L-701)

MODEL	
Military	T53-L-701
Lycoming	LTC1F-5
TYPE	
Application	Fixed Wing Aircraft
Mounting Points	Minimum of 3 Required for Installation
DIMENSIONS	
Overall Length	59.377 inches
Basic Nominal Diameter	23.00 inches
Local Projection Beyond Basic 23.00 Inches Diameter Radius (Max)	14.91 inches

Table 1-4. Engine Leading Particulars (T53-L-701) (Cont)

WEIGHT	
Specification Weight (Dry)	688 pounds
Estimated Weight of Residual Fluids	Oil - 6 pounds Fuel - 4 pounds
DIRECTIONAL ROTATION	
Compressor Rotor	Counterclockwise
Gas Producer Turbines	Counterclockwise
Power Turbines	Clockwise
Propeller Shaft	Clockwise
FUEL TYPE	MIL-T-5624 (Grade JP-4 or JP-5), MIL-F-46005 (CITE)
OIL TYPE	MIL-L-23699 or MIL-L-7808
MISCELLANEOUS	
Combustion Chamber	External Annular
Reduction Gear Ratio	12.38 to 1
Compressor Ratio	7 to 1
Altitude (Absolute)	25,000 Feet Minimum (at 1.0 ram pressure ratio)
Operating Temperature Range	-54° to 57°C (-65 to 135°F)

housing, located at the 4- and 8-o'clock positions, deliver atomized fuel to the combustion chamber during the starting period. A ball check valve within the nozzle permits air from the combustion chamber to purge the nozzles when starting fuel stops flowing.

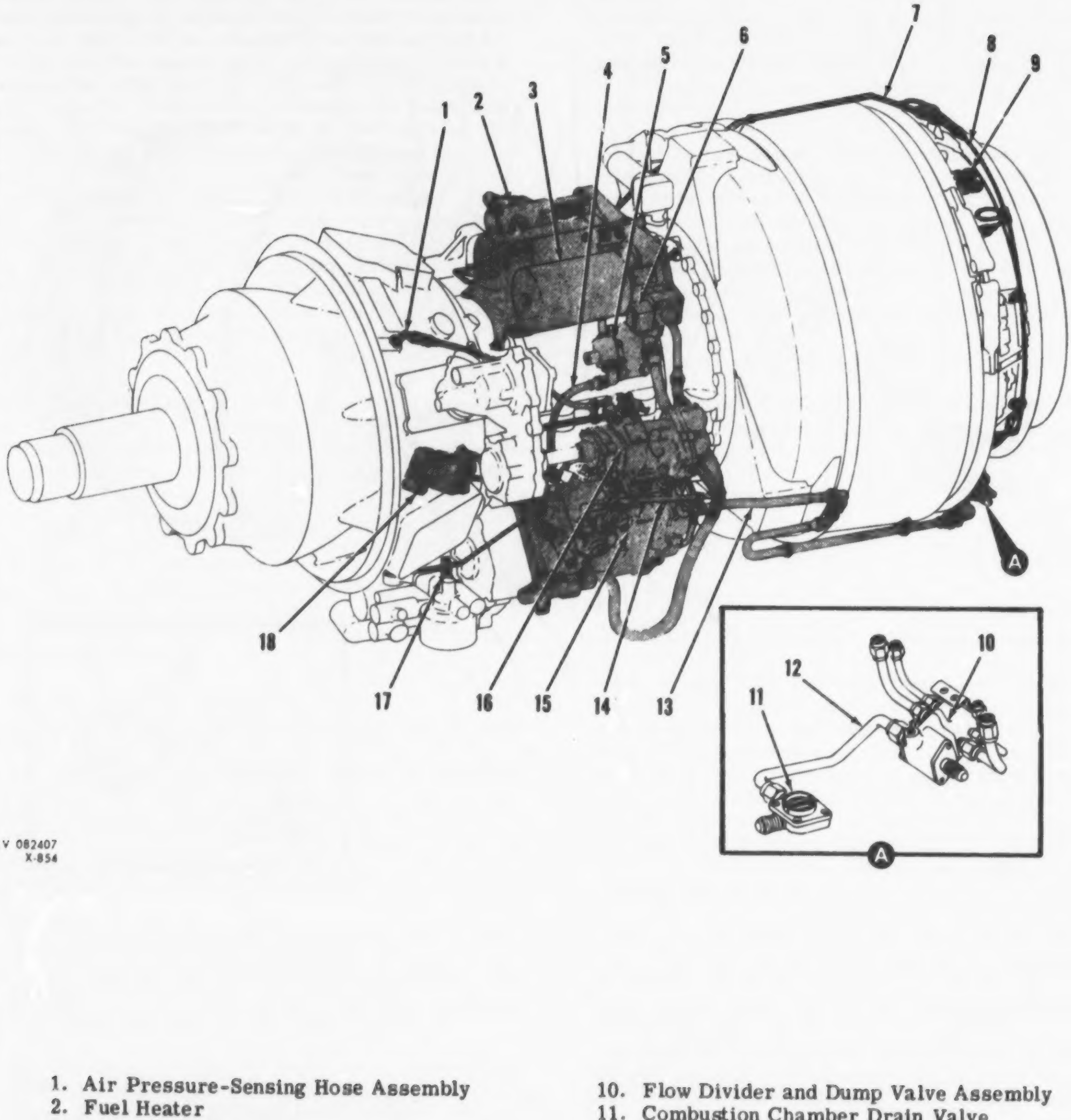
1-40. STARTING FUEL SYSTEM (T53-L-15/701 Engines). During engine start, actuating the starting fuel switch opens the starting fuel solenoid valve, allowing unmetered starting fuel from the fuel control to flow through the starting fuel manifold, four starting fuel nozzles, and into the combustion chamber where it is ignited by four igniter plugs. When N1 reaches sufficient speed (40 percent) the ignition system is deenergized, causing the solenoid valve to close and stop the flow of starting fuel. After engine start, any residual fuel that may be left in the starting fuel lines and starting fuel nozzles is purged by air from the combustion chamber through a check filter valve.

1-41. Starting Fuel Solenoid Valve. (See figure 1-8 or 1-9.) The starting fuel solenoid valve (5) is mounted on a bracket that is secured to the compressor housing at the 10-o'clock position. When the solenoid is energized, the valve opens, allowing unmetered starting fuel to flow to starting fuel nozzles. The solenoid valve is wired in conjunction with the ignition system. When sustained combustion is achieved, the starting fuel solenoid valve is deenergized, and the flow of starting fuel is shut off.

1-42. Starting Fuel Manifold. (See figures 1-8 and 1-9.) The starting fuel manifold (8) is mounted at t rear of the combustion chamber housing and secur to the support cone. The manifold receives fuel from the fuel control, through the starting fuel sol noid valve, and delivers it to the four starting fuel nozzles.

1-43. Starting Fuel Nozzles. Four starting fuel nozzles, located at the 2-, 4-, 8-, and 10-o'clock positions in the rear of the combustion chamber housing, deliver atomized fuel to the combustion chamber during starting.

1-44. MAIN FUEL SYSTEM (T53-L-7/7A Engines). The main fuel system delivers fuel pressure in the fu control, to actuate the main fuel outlet foot valve, is obtained at approximately 10 percent N1 speed. Metered fuel from the fuel control then flows throug the main fuel manifold, and is discharged through 11 fuel vaporizers into the combustion chamber where i is ignited by burning starting fuel.



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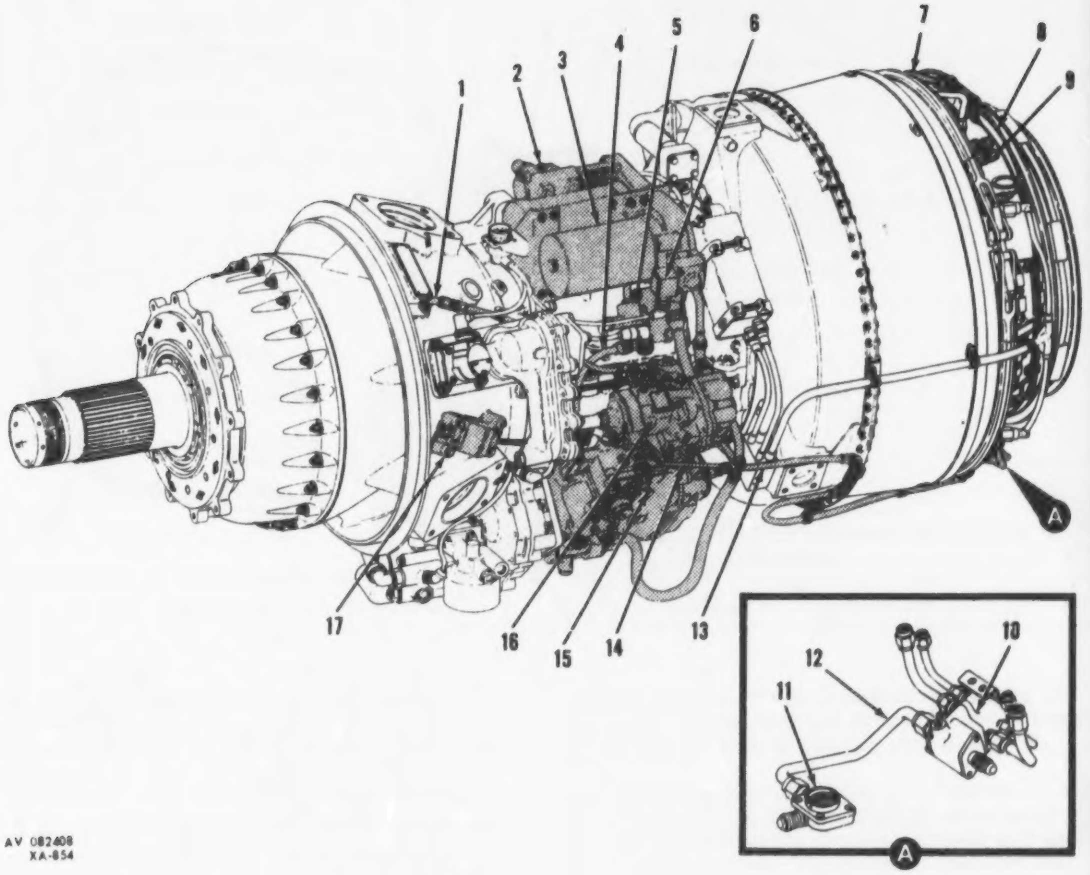
1. Air Pressure-Sensing Hose Assembly
2. Fuel Heater
3. Fuel Filter
4. Starting Fuel Hose Assembly
5. Starting Fuel Solenoid Valve
6. Fuel Filter Pressure Switch
7. Starting Fuel Hose Assembly
8. Starting Fuel Manifold
9. Main Fuel Manifold
10. Flow Divider and Dump Valve Assembly
11. Combustion Chamber Drain Valve
12. Flow Divider Drain Hose Assembly
13. Main Fuel Hose Assembly
14. Power Lever
15. Fuel Regulator
16. Topping Governor
17. Boost Pressure Tap
18. Temperature-Sensing Element

Figure 1-8. Fuel System External Components (T53-L-15)



1. Air Pressure-Sensing Hose Assembly
2. Fuel Heater
3. Fuel Filter
4. Starting Fuel Hose Assembly
5. Starting Fuel Solenoid Valve
6. Fuel Filter Pressure Switch
7. Starting Fuel Hose Assembly
8. Starting Fuel Manifold
9. Main Fuel Manifold
10. Flow Divider and Dump Valve Assembly
11. Combustion Chamber Drain Valve
12. Flow Divider Drain Hose Assembly
13. Main Fuel Hose Assembly
14. Power Lever
15. Fuel Regulator
16. Topping Governor
17. Temperature-Sensing Element

Figure 1-9. Fuel System External Components (T53-L-701)

1-45. Main Fuel Manifold. (See figure 1-7.) The main fuel manifold is bracketed to the starting fuel manifold and mounted at the rear of the combustion chamber housing. The main fuel manifold receives fuel from the fuel control through the main fuel hose and delivers it to the 11 fuel vaporizers.

1-46. Fuel Heater. (See figure 1-7.) A fuel heater (3), mounted to a bracket on top of the engine, prevents fuel icing by utilizing engine lubricating oil to heat the fuel. Fuel is supplied from the airframe fuel tank to the heater where it is preheated before passing on to the fuel filter unit and fuel regulator. Oil is supplied from the engine scavenge pump to the heater, and then is delivered to the airframe oil cooler. A fuel temperature control valve maintains fuel temperature. Fuel and oil bypass valves provide for fluid flow if the fuel heater cores are clogged. The fuel heater supplies fuel in a temperature range between 35 to 70°F when fuel inlet temperatures are in the -65 to 70°F range. The oil bypass valve operates when the oil pressure drop through the fuel heater exceeds 13 psi. The fuel bypass valve operates when fuel pressure differential through the fuel heater exceeds 18 psi.

1-47. Main Fuel Filter. (See figure 1-7.) A fuel filter (2), mounted to a bracket on top of the engine and attached to the fuel heater, filters fuel from fuel heater through a pleated filter element. As fuel passes through filter element, contaminants are deposited on the outer walls of the element. If clogging of element occurs, a bypass valve allows continuous operation at a slightly higher pressure level. A fuel filter impending-bypass warning switch provides cockpit indication of contamination. The switch will give approximately 4 hours warning before filter contamination results in fuel being bypassed.

1-48. Bypass Fuel Filter. (See figure 1-7.) A bypass fuel filter (9), located on lower left side of combustion chamber housing, filters fuel from the fuel control through a corrosion-resistant, 200-mesh, stainless steel element. As fuel passes through filter element, contaminants are deposited on inner wall of filter element. If clogging of element occurs, fuel will bypass element into an annulus within the filter housing, and be supplied to the main fuel manifold.

1-49. Fuel Vaporizers. Eleven equally spaced fuel vaporizers deliver main fuel to the combustion chamber. The fuel vaporizers receive fuel from main fuel manifold, combine it with compressed air, and deliver air and vaporized fuel to combustion chamber.

1-50. Combustion Chamber Drain Valve. The combustion chamber drain valve is located at the 6-o'clock position on the combustion chamber housing. The drain valve is spring-loaded open to allow drainage of residual fluids after engine shutdown. Internal pressure during engine operation keeps valve closed.

1-51. Fuel Control Assembly. The fuel control assembly consists of a metering section, a computer section and a topping governor. The metering section is driven at a speed proportional to N1 speed. It pumps fuel to the engine through the main metering valve or, if the main system fails, through the emergency metering valve which is positioned directly by the power lever. The computer section determines the rate of main fuel delivery by biasing main metering valve opening for N1 speed, inlet air temperature and pressure, and power lever position. It also controls the operation of the compressor airbleed system. The topping governor is driven at a speed proportional to N2 speed. In the event of a propeller governor failure, it will decrease the main metering valve opening to reduce fuel flow to the engine. Topping governor cut-in speed range for takeoff is 1853 to 1877 rpm. Reverse cut-in speed range is 1649 to 1710 rpm.

1-52. The fuel control incorporates provisions for an emergency fuel system, which can be utilized in the event of failure of the automatic or normal fuel control system. The emergency fuel system is operative when the fuel control selector switch is changed from AUTOMATIC (NORMAL) position to EMERGENCY (MANUAL) position. When the emergency system is in use, the main metering valve is manually positioned by the power lever. Acceleration and deceleration control is not provided in the emergency system.

1-53. The power lever on the fuel control modulates the engine from reverse to takeoff power. Total travel of the lever is 97 to 103 degrees, with positions as follows:

Full Reverse	-2 to 2 degrees
Ground Idle	23 to 26 degrees
Flight Idle	38 to 42 degrees
Normal	83 degrees
Military	90 to 93 degrees
Takeoff	99 to 101 degrees

1-54. MAIN FUEL SYSTEM (T53-L-15/701 Engines). The main fuel system delivers main fuel to the combustion chamber. Minimum fuel pressure in the fuel control to actuate the main fuel outlet foot valve is obtained at 5 to 13 percent N1 speed. Metered fuel from the fuel control flows through the flow divider assembly and into main fuel manifold. Fuel from the manifold is discharged through 22 fuel nozzles into the combustion chamber where it is ignited by the burning starting fuel.

1-55. Flow Divider Assembly. (See figure 1-8 or 1-9.) The flow divider and dump valve assembly (10) is mounted under the exhaust diffuser support cone at the 6-o'clock position. The flow divider assembly receives fuel from the fuel control and delivers it to the main fuel manifold through two passages. At low N1 speeds, the flow divider sends fuel through the primary system of the manifold. As N1 speed increases, fuel pressure increases, and the flow divider opens ports to the secondary system of the main fuel manifold. The flow divider is equipped with a drain port to drain the main fuel manifold and flow divider during engine shutdown.

1-56. Main Fuel Manifold. (See figure 1-8 or 1-9.) Two main fuel manifolds (9) are secured to the rear of the combustion chamber housing. They receive fuel from the flow divider assembly, and deliver it to 22 fuel nozzles through the primary and secondary fuel passages.

1-57. **Fuel Heater.** Refer to paragraph 1-46.

1-58. **Main Fuel Filter.** Refer to paragraph 1-47.

1-59. **Fuel Nozzles.** Twenty-two dual-orifice atomizing fuel nozzles are installed in the main fuel manifolds. The nozzles contain two separate passages connected to corresponding passages in the main fuel manifolds. Fuel nozzles atomize the fuel and deliver it into the combustion chamber.

1-60. **Combustion Chamber Drain Valve.** (See figure 1-8 or 1-9.) The combustion chamber drain valve (11) is at the 6-o'clock position on the combustion chamber housing. The drain valve is spring loaded open to allow drainage of residual fluids during engine shutdown. Internal pressure during engine operation keeps the valve closed. A port is at the side of the drain valve housing to allow unburned fuel to drain from the flow divider assembly through the overboard drain valve during engine shutdown.

1-61. **Fuel Control Assembly.** The fuel control assembly consists of topping governor (16) and a fuel regulator (15). The topping governor reduces gas producer and power turbine speed in the event of a propeller governor malfunction which would allow the propeller to overspeed. The fuel regulator is a hydromechanical device containing a dual-element fuel pump, compressor rotor speed governor, acceleration and deceleration control, airbleed control signal mechanism, inlet guide vane control signal mechanism, and fuel shutoff valve. Functionally, the fuel regulator is divided into the flow control section and a computer section. The flow control section consists of components that meter engine fuel flow. The computer section is comprised of elements that schedule the position of the metering valve of the flow control section as a function of input signals. On the T53-L-15 engines, the fuel control incorporates a military power torque-limiting device which prevents exceeding the maximum rated mechanical limit of 97 ± 3 psi indicated torque (3580 pound-feet torque).

1-62. The acceleration fuel flow limits are scheduled over the entire operating range by scheduling maximum fuel flow as a function of gas producer turbine rotor speed and compressor inlet pressure and temperature. The absolute maximum fuel flow for acceleration, or steady state operation, is determined by the maximum fuel flow stop setting.

1-63. The deceleration fuel flow limits are scheduled as a function of gas producer turbine rotor speed and compressor inlet pressure and temperature. The absolute minimum fuel flow for deceleration, or steady state operation, is determined by the minimum fuel flow stop.

1-64. The power lever (14, figure 1-8 or 1-9) on the fuel control modulates the engine from reverse to military power. Total travel of the lever is 97 to 103 degrees, with positions as follows:

Full Reverse	-2 to 2 degrees
Ground Idle	23 to 26 degrees
Flight Idle	38 to 42 degrees
Normal	94 degrees
Military	100 degrees

1-65. LUBRICATION SYSTEM. (See figures 1-10 through 1-12.) The engine lubrication system consists of the main oil-pressure supply system and oi scavenge system. Principal components of the lubr cation system are lube oil filter assembly, power-driven rotary (oil) pump, power-driven rotary (booster) pump, and associated external hose asse blies and internal passages. On T53-L-7/7A/15 engines, a power-driven rotary (booster) pump is i cluded as a principal component in the lubrication system. The engine lubrication system will operat satisfactorily at a maximum oil-inlet temperature of 200°F (93°C) using lubricating oil (item 63 or 64 table 2-2).

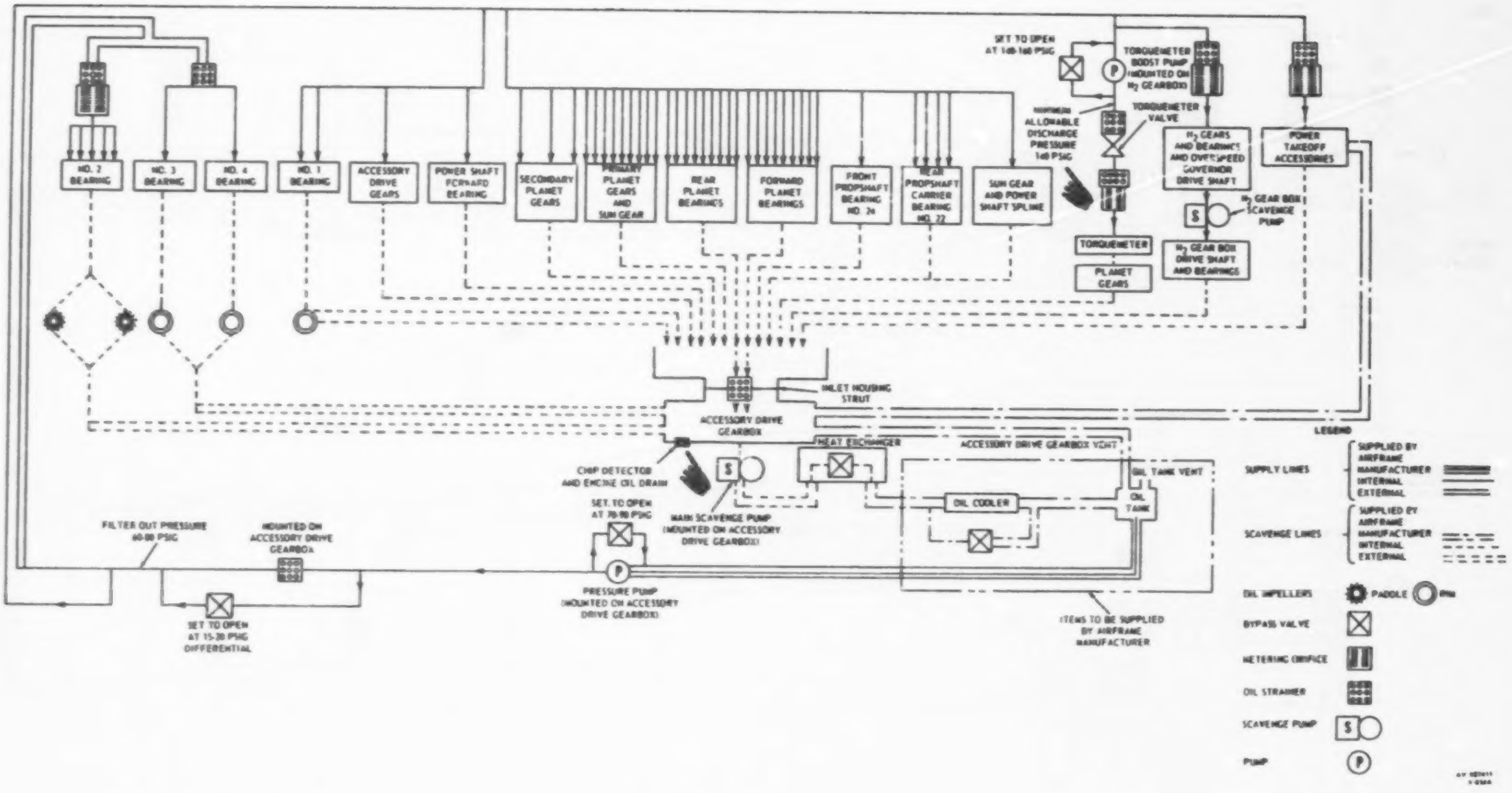
1-66. Engine oil is supplied from an aircraft-mou oil tank. (See figures 1-10 through 1-12.) Oil enter the power-driven rotary (oil) pump on the accessor drive gearbox, and discharges through internal passages to the oil filter. Filtered oil is directed into two main flow paths.

a. One flow path is through internal passages in the accessory drive gearbox and air inlet housing, supplying oil to power takeoff pad, and to the reduction gear section to lubricate reduction gears, overspeed governor and tachometer drive assembly, accessory drive carrier, and No. 1 bearing. On T53-L 7/7A/15 engines, this same flow path supplies oil t the power-driven rotary (booster) pump and torquemeter. The second oil flow path is through externa oil-pressure hoses to rear section of engine for lubrication of No. 2, 3 and 4 main bearings.

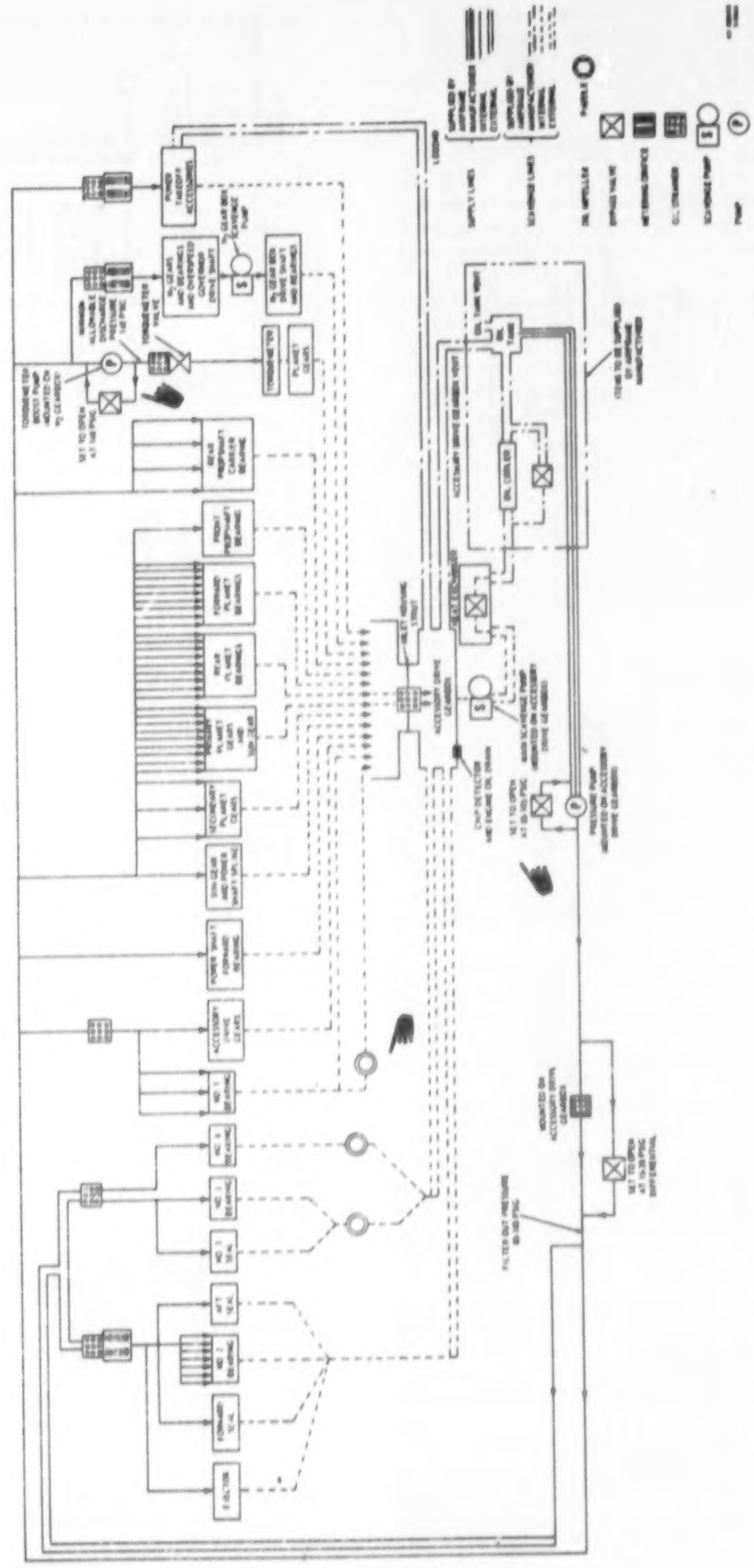
b. In the inlet housing section, oil is directed through the accessory drive carrier flange into the propeller shaft rear support bearing. Internally drilled passages and an annulus in the rear propell shaft bearing support serve as a common oil manif

c. Oil from the manifold is directed to the acce sory drive carrier assembly for forced-feed spray lubrication of carrier gears, accessory drive pinio gear, and power shaft support bearing. The No. 1 main bearing is lubricated by a transfer tube from the accessory drive carrier. Pressurized oil from the support manifold lubricates the propeller shaft rear support bearing. From the propeller shaft rear support bearing, oil is directed through an internal passage in the inlet housing to the power tak off mounting flange. Oil, as required, passes throu a strainer and metering orifice to supply lubricatio for an engine-mounted airframe accessory.

d. On T53-L-7/7A/15 engines, a second oil tran fer passage from the manifold directs oil into the propeller shaft, spraying the sun gearshaft, propell shaft front support bearing, planet gears, and bearings. On T53-L-701 engines, the flow path from th manifold is directed forward through transfer tube


SET TO OPEN
AT 140-160 PSIG
TORQUEMETER
BOOST PUMP
(MOUNTED ON
N2 GEARBOX)
MAXIMUM
ALLOWABLE
DISCHARGE
PRESSURE
140 PSIG
TORQUEMETER
VALVE
NO. 2
BEARING
NO. 3
BEARING
NO. 4
BEARING
NO. 1
BEARING
ACCESSORY
DRIVE
GEARS
POWER SHAFT
FORWARD
BEARING
SECONDARY
PLANET
GEARS
PRIMARY
PLANET
GEARS
AND
SUN GEAR
REAR
PLANET
BEARINGS
FORWARD
PLANET
BEARINGS
FRONT
PROPSHAFT
BEARING
NO. 26
REAR
PROPSHAFT
CARRIER
BEARING
NO. 22
SUN GEAR
AND POWER
SHAFT SPLINE
N2 GEARS
AND BEARINGS
AND OVERSPEED
GOVERNOR
DRIVE SHAFT
POWER
TAKEOFF
ACCESSORIES
N2 GEAR BOX
SCAVENGE
PUMP
S
N2 GEAR BOX
DRIVE SHAFT
AND BEARINGS
TORQUEMETER
PLANET
GEARS
INLET HOUSING
STRUT
ACCESSORY DRIVE
GEARBOX
HEAT EXCHANGER
ACCESSORY DRIVE GEARBOX VENT
OIL TANK VENT
OIL
TANK
OIL COOLER
CHIP DETECTOR
AND ENGINE OIL DRAIN
S
MAIN SCAVENGE PUMP
(MOUNTED ON ACCESSORY
DRIVE GEARBOX)
SET TO OPEN
AT 70-90 PSIG
P
PRESSURE PUMP
(MOUNTED ON ACCESSORY
DRIVE GEARBOX)
FILTER OUT PRESSURE
60-80 PSIG
MOUNTED ON
ACCESSORY DRIVE
GEARBOX
SET TO OPEN
AT 15-20 PSIG
DIFFERENTIAL
ITEMS TO BE SUPPLIED
BY AIRFRAME
MANUFACTURER
LEGEND
SUPPLY LINES
SUPPLIED BY
AIRFRAME
MANUFACTURER
INTERNAL
EXTERNAL
SCAVENGE LINES
SUPPLIED BY
AIRFRAME
MANUFACTURER
INTERNAL
EXTERNAL
OIL IMPELLERS
PADDLE
PIN
BYPASS VALVE
METERING ORIFICE
OIL STRAINER
SCAVENGE PUMP
S
PUMP
P

1-10. Lubrication System Diagram (T53-L-7/7A)


EJECTOR
FORWARD SEAL
NO. 2 BEARING
ACCESSORY DRIVE GEARS
POWER SHAFT FORWARD BEARING
SUN GEAR AND POWER SHAFT SPLINE
SECONDARY PLANET GEARS
REAR PLANET BEARINGS
FORWARD PLANET BEARINGS
FRONT PROPSHAFT BEARING
REAR PROPSHAFT CARRIER BEARING
TORQUEMETER
PLANET GEARS
OIL COOLER
OIL TANK

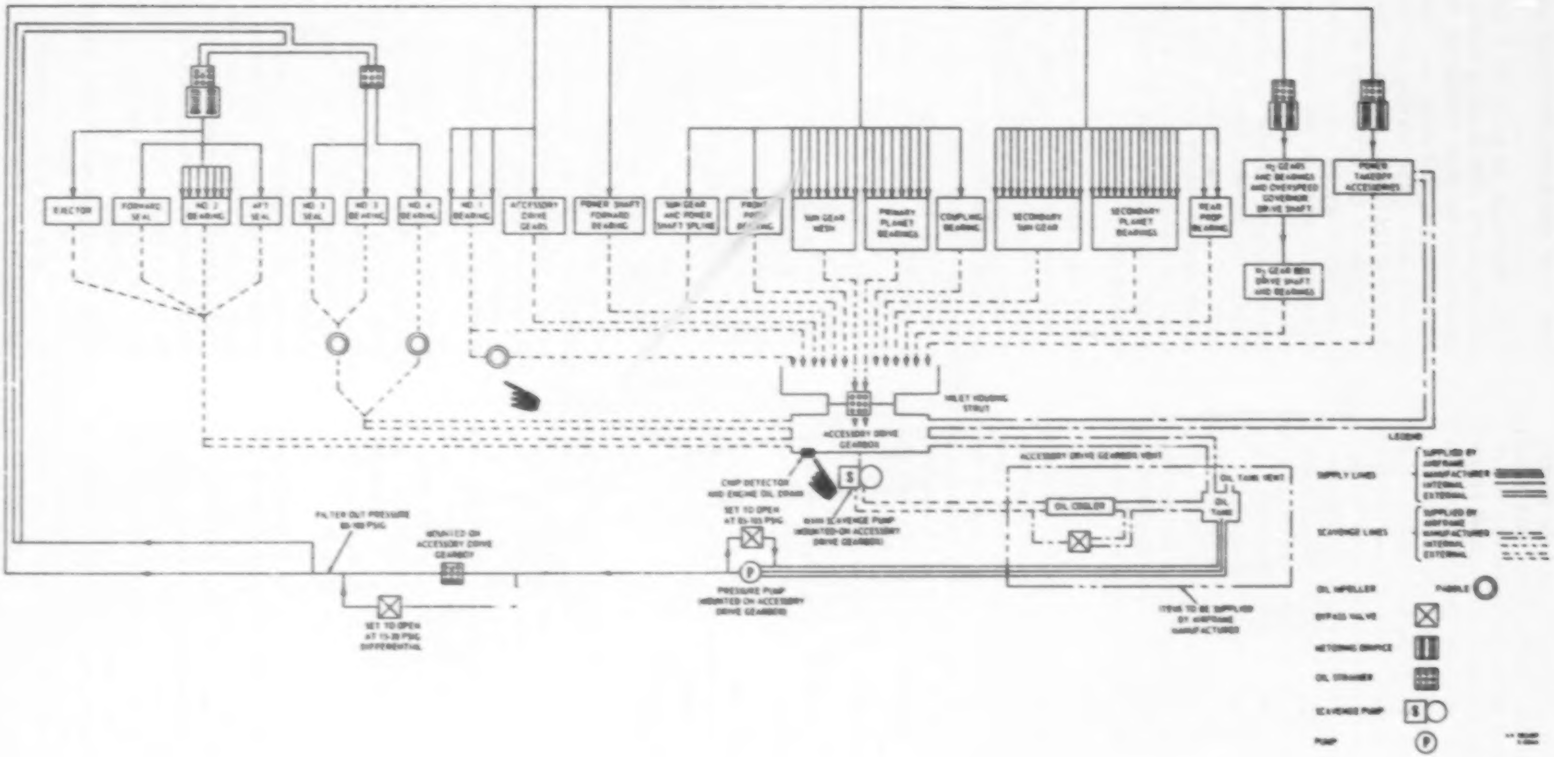

EJECTOR
FORWARD SEAL
NO. 2 BEARING
AFT SEAL
NO. 3 SEAL
NO. 3 BEARING
NO. 4 BEARING
NO. 1 BEARING
ACCESSORY DRIVE GEARS
POWER SHAFT FORWARD BEARING
SUN GEAR AND POWER SHAFT SPLINE
FRONT PROP BEARING
SUN GEAR MESH
PRIMARY PLANET BEARINGS
COUPLING BEARING
SECONDARY SUN GEAR
SECONDARY PLANET BEARINGS
REAR PROP BEARING
N2 GEARS AND BEARINGS AND OVERSPEED GOVERNOR DRIVE SHAFT
N2 GEAR BOX DRIVE SHAFT AND BEARINGS
POWER TAKEOFF ACCESSORIES
INLET HOUSING STRUT
ACCESSORY DRIVE GEARBOX
CHIP DETECTOR AND ENGINE OIL DRAIN
SET TO OPEN AT 85-105 PSIG
MAIN SCAVENGE PUMP MOUNTED ON ACCESSORY DRIVE GEARBOX
PRESSURE PUMP MOUNTED ON ACCESSORY DRIVE GEARBOX
ACCESSORY DRIVE GEARBOX VENT
OIL TANK VENT
OIL TANK
OIL COOLER
ITEMS TO BE SUPPLIED BY AIRFRAME MANUFACTURER
FILTER OUT PRESSURE 85-105 PSIG
MOUNTED ON ACCESSORY DRIVE GEARBOX
SET TO OPEN AT 15-20 PSIG DIFFERENTIAL
LEGEND
SUPPLY LINES
SUPPLIED BY AIRFRAME MANUFACTURER
INTERNAL
EXTERNAL
SCAVENGE LINES
SUPPLIED BY AIRFRAME MANUFACTURER
INTERNAL
EXTERNAL
OIL IMPELLER
PADDLE
BYPASS VALVE
METERING ORIFICE
OIL STRAINER
SCAVENGE PUMP
S
PUMP
P

Figure 1-12. Lubrication System Diagram (T53-L-701)

into the secondary planet gear carrier assembly, and to an annulus created by sealing rings of the spacer installed over the propeller shaft. From this annulus, oil is fed through drilled passages in the secondary carrier to lubricate the six secondary planet gears and bearings. The secondary sun gear and ring gear, in turn, are lubricated through gear mesh with the secondary planet gears. Oil from the annulus passes through drilled holes located on the spacer within the annulus, and is directed forward in the area between the spacer and propeller shaft and into drilled passages in the propeller shaft. These passages allow oil to flow into the support struts of the primary gear carrier, and, through drilled oil jets, lubricates the four primary planetary gears and their bearings. The primary sun gear and ring gear are lubricated through gear mesh with the primary planet gears. The oil from propeller shaft passages continues to flow forward to lubricate the forward propeller shaft bearing, propeller shaft plug, primary sun gear, and power shaft splines.

e. A third oil transfer passage from the manifold directs oil through an air inlet strut to the mounting pad of the overspeed governor and tachometer drive assembly. On T53-L-7/7A/15 engines, oil is directed to a power-driven rotary (booster) pump, mounted on and driven by the overspeed governor and tachometer drive assembly. This assembly includes a pressure-regulating valve that regulates the output pressure of the rotary pump by circulating excess pressurized oil back to the rotary pump inlet port. Pressure oil from the rotary pump is directed through an air inlet strut to the torquemeter valve on the torquemeter cylinder.

f. An offset passage in the overspeed governor and tachometer drive assembly mounting flange supplies oil to the strainer and metering cartridge which directs metered oil to the overspeed governor and tachometer drive gear train.

g. Oil flow to the rear section of the engine is supplied from an oil pressure port at the 5-o'clock position on the inlet housing, and through an external flexible oil hose to an external manifold mounted on the forward face of the diffuser housing. Oil from this manifold is directed in two paths. The first path feeds oil to the No. 2 bearing through strainer located on the bottom of the air diffuser. The second path directs oil through external plumbing to the No. 3 and 4 bearings through a strainer located on the exhaust diffuser upper strut. On T53-L-15/701 engines, bearing oil also is used as a seal runner coolant.

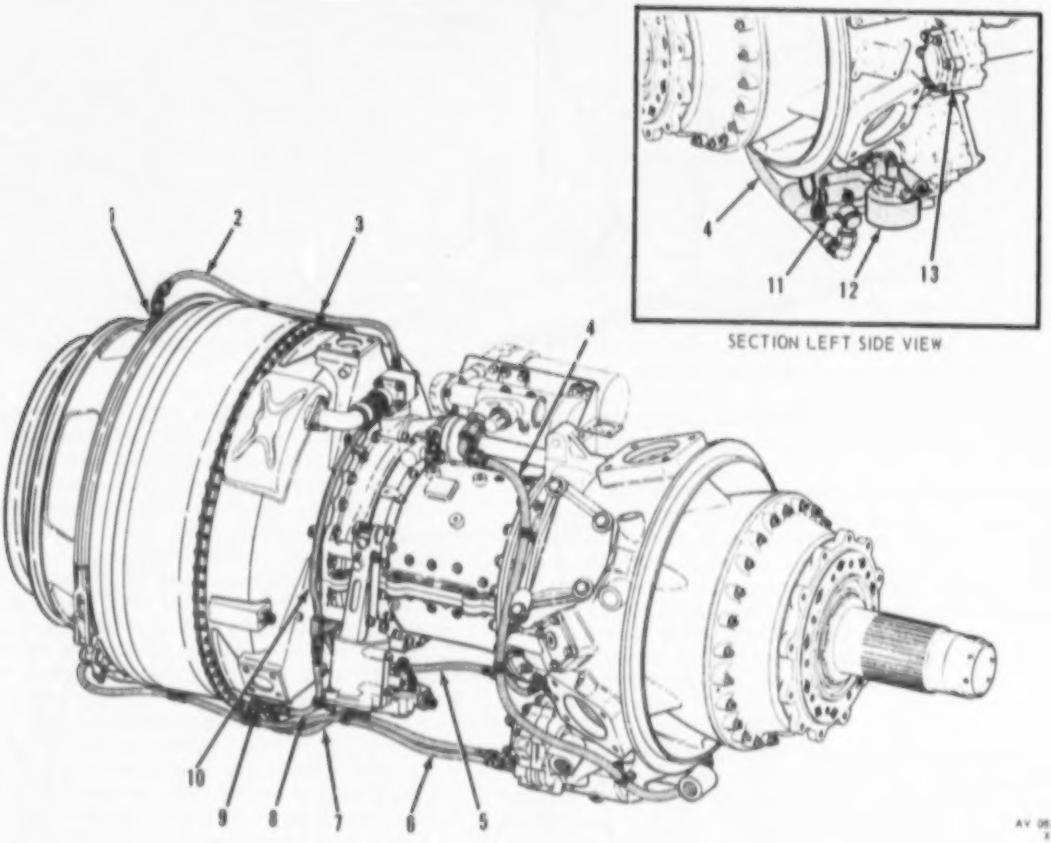
1-67. All internal scavenge oil from the inlet housing section drains through the hollow support strut at the 6-o'clock position in the inlet housing, through a screen and transfer tube, and into the accessory drive gearbox. The gears and bearings in the gearbox are lubricated by the return oil flow; in addition, a drilled passage directs oil to the fuel control drive splines. On T53-L-7/7A/15 engines, the scavenge section of the power-driven rotary (booster) pump returns oil from the upper part of the overspeed governor and tachometer drive assembly to the lower part; it drains from here, by gravity, to the inlet housing strut. Scavenging of the overspeed governor and tachometer drive gearbox on the T53-L-701 engine is accomplished by the oil overflow method.

1-68. Scavenge oil from No. 1 main bearing is pumped to the inlet housing struts by an oil impeller mounted on the rear of bearing. Scavenge oil from No. 2 main bearing (aided by two impellers: one mounted on each side of the bearing on T53-L-7/7A) flows through a scavenge oil tube in the diffuser housing; it is directed to the accessory drive gearbox by an external scavenge oil hose. Scavenge oil from No. 3 and 4 bearings, aided by two impellers located in the bearing housing, returns to the accessory drive gearbox through an oil tube that extends through the bottom strut of the exhaust diffuser, and connects to an external oil scavenge hose. The scavenge portion of the power-driven rotary (oil) pump returns scavenge oil from the accessory drive gearbox, through the fuel heater, and through the aircraft oil cooler to the oil storage tank.

1-69. On T53-L-7/7A/15 engines, the torquemeter is a hydromechanical torque-measuring device located in reduction gearing section of inlet housing. The torquemeter uses lubricating oil boosted to a high pressure by power-driven rotary (booster) pump. It consists of a stationary plate, a movable plate attached to planet gear carrier, and 24 steel balls positioned in conical pockets located in both plates. Resistance to rotation of planetary gears, due to load on propeller, causes carrier-mounted plate to rotate slightly. Torquemeter balls are displaced from their individual pockets, forcing rear torquemeter plate to move rearward. Rearward motion of torquemeter plate unseats a spring-located poppet valve, permitting high-pressure oil to enter torquemeter cylinder chamber and equalize force tending to cause rearward movement of torquemeter plate. Torquemeter oil pressure from cylinder and air pressure from accessory drive gearbox are directed to aircraft torquemeter transmitter and gage which indicates differential torque oil pressure in psi. Differential torque oil pressure is proportional to torque delivered to propeller shaft. On T53-L-15, external lines direct torquemeter oil and gearbox pressure to the torque-limiting device on the fuel control to prevent overtorque at military power.

1-70. Power-Driven Rotary (Oil) Pump. (See figures 1-13 through 1-15.) The power-driven rotary (oil) pump (11 or 10) is a two-element vane-type pump. One element supplies lubricating oil pressure; the other element returns scavenge oil to the aircraft-mounted oil tank. A common splined drive shaft drives both elements. A pressure relief valve in the power-driven rotary (oil) pump is adjusted to deliver 60 to 80 psi (T53-L-7/7A engines) or 80 to 100 psi (T53-L-15/701 engines) oil pressure, at normal rated power and above, measured at the oil filter discharge port. This setting is rated for a maximum inlet oil temperature of 200° F. At pressure below relief valve setting, oil pressure is directly proportional to compressor rotor speed.

1-71. Lube Oil Filter Assembly. (See figures 1-13 through 1-15.) The wafer-disc type lube oil filter assembly (12, 10, or 9) is bolted to the accessory



1. No. 3 and 4 Bearings Oil Strainer Housing
2. No. 3 and 4 Bearings Oil Pressure Hose
3. Clamp (Typical)
4. Fuel Heater Oil Hose
5. Inlet Housing Oil Outlet Pressure Hose
6. No. 3 and 4 Bearings Oil Scavenge Hose
7. No. 2 Bearing Oil Scavenge Hose
8. No. 2 Bearing Oil Pressure Hose
9. No. 2 Bearing Oil Strainer
10. Hose Assembly
11. Rotary (Oil) Pump
12. Lube Oil Filter Assembly
13. Power-Driven Rotary (Booster) Pump

Figure 1-13. Lubrication System External Components (T53-L-7/7A)

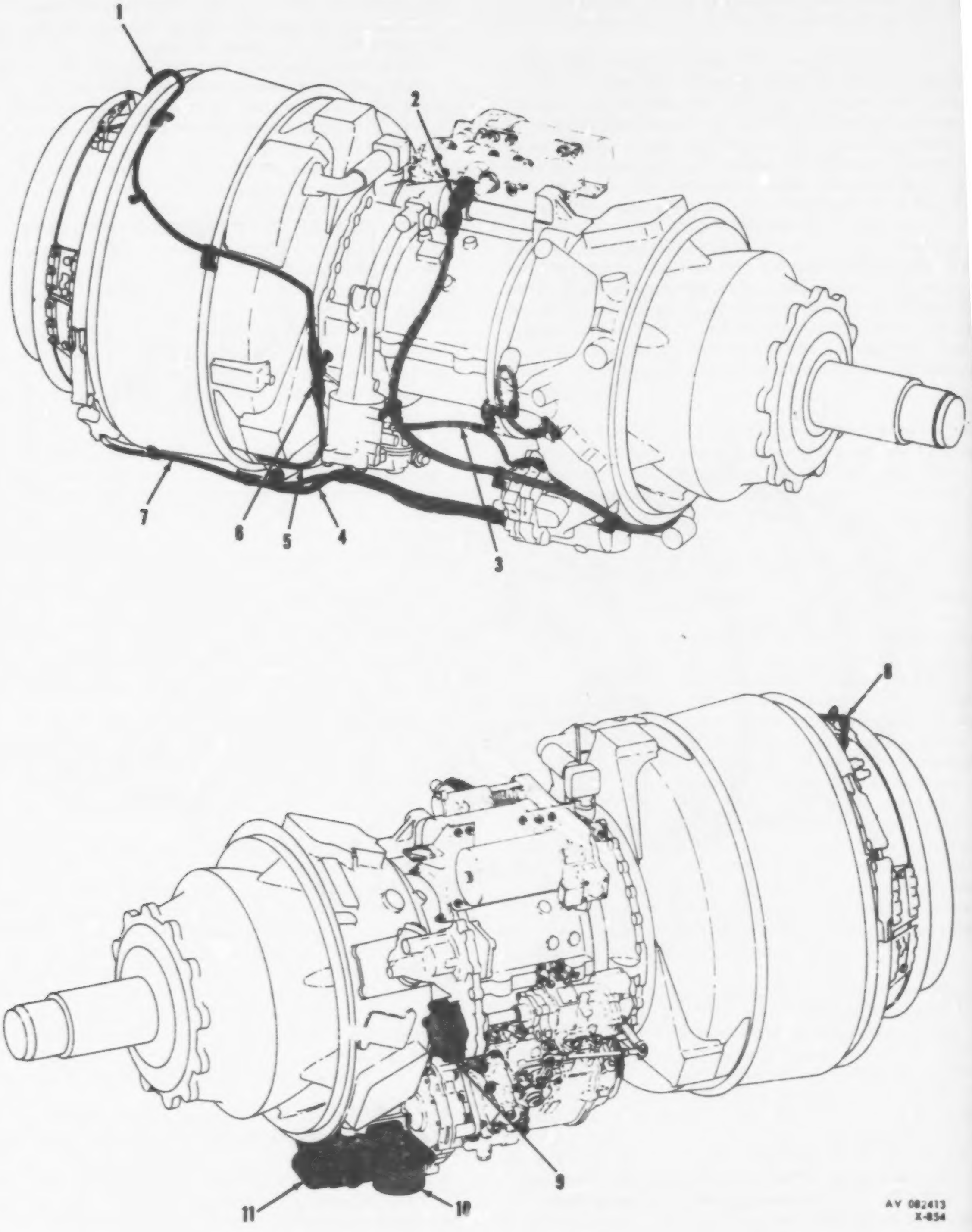

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Figure 1-14. Lubrication System External Components (T53-L-15)

Key to Figure 1-14.

1. Oil Pressure Hose Assembly to No. 3 and 4 Bearings
2. Fuel Heater Oil Hose
3. Oil Pressure Hose Assembly to Lube Pressure Manifold
4. Oil Scavenge Hose Assembly From No. 2 Bearing
5. Oil Pressure Hose Assembly to No. 2 Bearing Filter
6. Lube Pressure Manifold
7. Oil Scavenge Hose Assembly From No. 3 and 4 Bearings
8. No. 3 and 4 Bearings Oil Strainer Housing Adapter
9. Power-Driven Rotary (Booster) Pump
10. Lube Oil Filter Assembly
11. Power-Driven Rotary (Oil) Pump

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drive gearbox. The filter contains a bypass valve, set to open at 15 to 20 psi differential pressure, that allows the oil flow to bypass filter elements and supply oil to the engine if filter elements are clogged. On T53-L-15/701 engines, an impending bypass button is incorporated which pops out at 9 to 13 psi differential pressure, indicating impending bypass.

1-72. Oil System Breather. An oil system breather connection is furnished on right side of accessory drive gearbox. This vent is connected to the aircraft oil tank, which is vented by the oil tank overboard breather.

1-73. Power-Driven Rotary (Booster) Pump (T53-L-7/7A/15 Engines). (See figures 1-13 and 1-14.) A power-driven rotary (booster) pump (13 and 9), containing pressure and scavenge elements, is mounted on and driven by the overspeed governor and tachometer drive assembly. Each element is an individual pumping unit, drawing oil from a separate source. The pressure element receives engine lubricating oil at 60 to 80 psi (T53-L-7/7A) or 80 to 100 psi (T53-L-15), and delivers it at a boosted pressure of 140 to 160 psi or 140 psi minimum (at normal rated power and above), through a filter to the torquemeter valve. A relief valve in the overspeed governor and tachometer drive assembly sets the power-driven rotary (booster) pump outlet pressure. Excess oil flows back to the inlet side of the pump. The scavenge element receives oil from the overspeed governor and tachometer drive gear housing, and delivers it to the oil return passages in the inlet housing assembly.

1-74. Chip Detector. A chip detector is installed in the lower right side of the accessory drive gearbox. Electrical circuitry through the electrical cable assembly allows for a continuous monitoring of the engine oil system through an indicator lamp mounted in the cockpit.

1-75. TORQUEMETER SYSTEM (T53-L-701 Engines.) (See figures 1-16 and 1-17.) The torque system provides an electrical torque signal for operation of a torque indicator. The signal is read on the cockpit indicator as pounds per square inch (psi) of torque. The torquemeter system theory of operation makes use of the magnetostriction effect, which is the change of the magnetic reluctance of metal as a function of the stress imposed. When subjected to torsion, the sun gearshaft has tension at 45 degrees to the axis and compression at 45 degrees to the axis, but at 90 degrees from the tension. These forces in the shaft are utilized by a transformer, called the head assembly, which has a primary coil that generates a constant magnetic flux proportional to the forces exerted on the shaft. The head assembly coil also has two secondary windings; one oriented in the tension direction (45 degrees to the axis of the shaft) and the other in the compression direction. The stationary head assembly is so oriented that the surface of the rotating sun gearshaft acts as the core of the transformer. Thus, the current induced in the two secondaries varies with the tension stresses and compression stresses caused by torque applied to the shaft. As the torque stress in the shaft increases, the difference in the current induced in the secondaries of the head also increases.

1-76. The engine components of the torquemeter system are the primary sun gearshaft, torquemeter head assembly, and electrical torquemeter junction box. These components comprise a calibrated system. Replacement of any one of these three components must be accomplished at Depot level. The airframe components of the torquemeter system are a power supply (inverter) and an indicator. They can be replaced individually without engine torquemeter recalibration.

1-77. Electrical Torque System Components Functional Description. (See figure 1-16.) The sun gearshaft is the core element of the transformer. The electrical torquemeter head assembly is the transformer containing both primary and secondary coils. The electrical torquemeter junction box assembly converts output of the secondary coils to direct current, and provides means for standardizing the output so that no adjustment for calibration needs to be made in the airframe components of the system. The power supply provides alternating current used by the primary coils of the head assembly. (This is an airframe part.) The indicator senses the current produced by the two transformer secondary windings. The difference in current creates the torque indication. (The indicator is an airframe part.)

1-78. ELECTRICAL SYSTEM. (See figures 1-18 through 1-20.) The electrical system provides circuitry for starting, ignition, and for all electrical accessories.

1-79. Electrical Cable Assembly. The main wiring harness incorporates quick-disconnect type connectors for airframe electrical input, and for engine

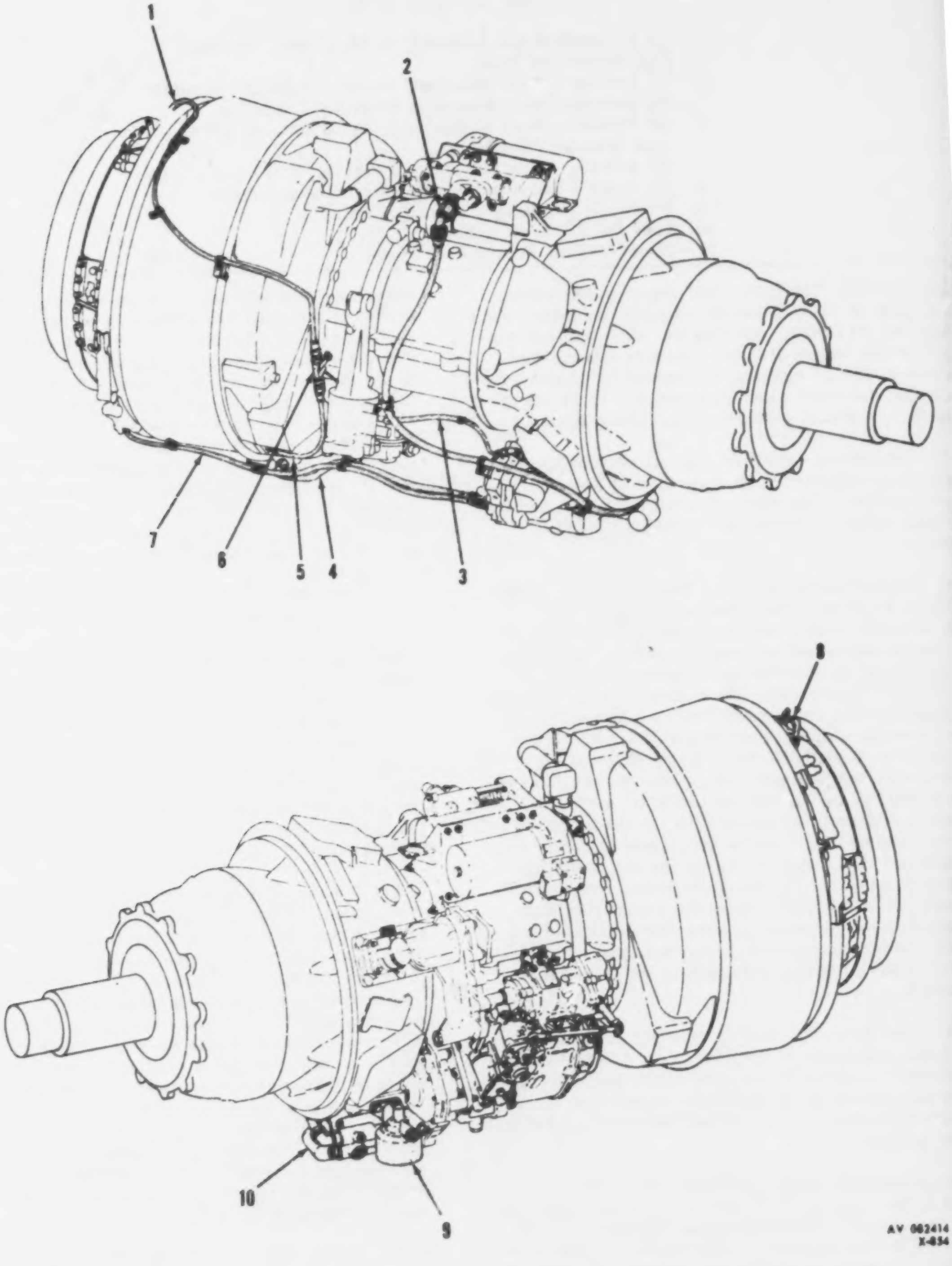
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Figure 1-15. Lubrication System External Components (T53-L-701)

Key to Figure 1-15.

1. Oil Pressure Hose Assembly to No. 3 and 4 Bearings
2. Fuel Heater Oil Hose
3. Oil Pressure Hose Assembly to Lube Pressure Manifold
4. Oil Scavenge Hose Assembly From No. 2 Bearing
5. Oil Pressure Hose Assembly to No. 2 Bearing Filter
6. Lube Pressure Manifold
7. Oil Scavenge Hose Assembly From No. 3 and 4 Bearings
8. No. 3 and 4 Bearings Oil Strainer Housing Adapter
9. Lube Oil Filter Assembly
10. Power-Driven Rotary (Oil) Pump

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ignition unit, hot-air solenoid valve, starting fuel solenoid valve, inlet oil temperature bulb, power turbine and gas producer turbine tachometer generators, fuel filter impending bypass warning, and chip detector. The T53-L-701 main wiring harness also provides a connector for electrical torquemeter junction box.

1-80. Ignition Unit. (See figures 1-21 through 1-23.) The ignition unit (13, 12, or 12) is attached to a bracket at the 10-o'clock position on the impeller housing rear flange. The ignition unit requires 24 volts dc nominal input at 2.0 amperes (T53-L-7/7A) or 3.0 amperes (T53-L-15/701). The ignition unit converts low voltage, through a vibration transformer, to a high voltage that passes through the ignition lead and coil assembly. The high voltage produced ionizes a gap in each igniter plug to produce a spark.

1-81. Ignition Lead and Coil Assembly. (See figures 1-21 through 1-23.) The ignition lead and coil assembly (16 and 14) transmits high voltage from the ignition unit to igniter plugs in combustion chamber. The spark splitter coil, located below the ignition unit, provides four leads to distribute high voltage equally to each igniter plug.

1-82. IGNITER PLUGS. (See figures 1-21 through 1-23.) Four igniter plugs (8 and 14, figure 1-21, and plugs, 2, figures 1-22 and 1-23) are installed in receptacles in aft end of combustion chamber at the 4- and 8-o'clock positions (T53-L-7/7A), 2-, 4-, 8-, and 10-o'clock positions (T53-L-15/701). The igniter plugs provide a gas for high-voltage sparks to ignite the fuel/air mixture in the combustion chamber during starting sequence.

1-83. INLET OIL TEMPERATURE BULB. (See figures 1-21 through 1-23.) An inlet oil temperature bulb and connector (18, 16, or 17) is installed in power-driven rotary (oil) pump. This bulb is connected through the wiring harness to a cockpit indicator.

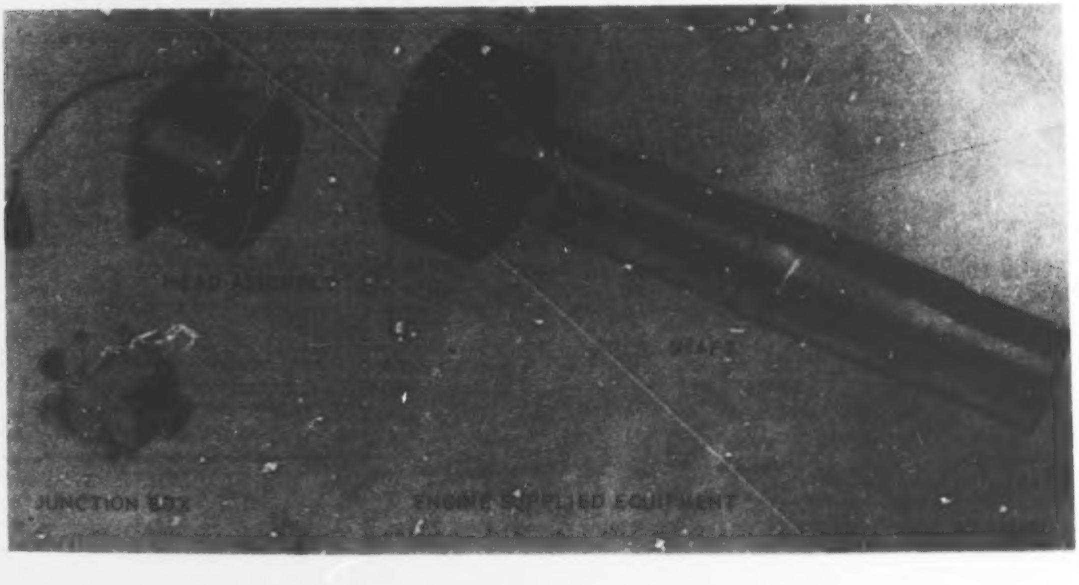
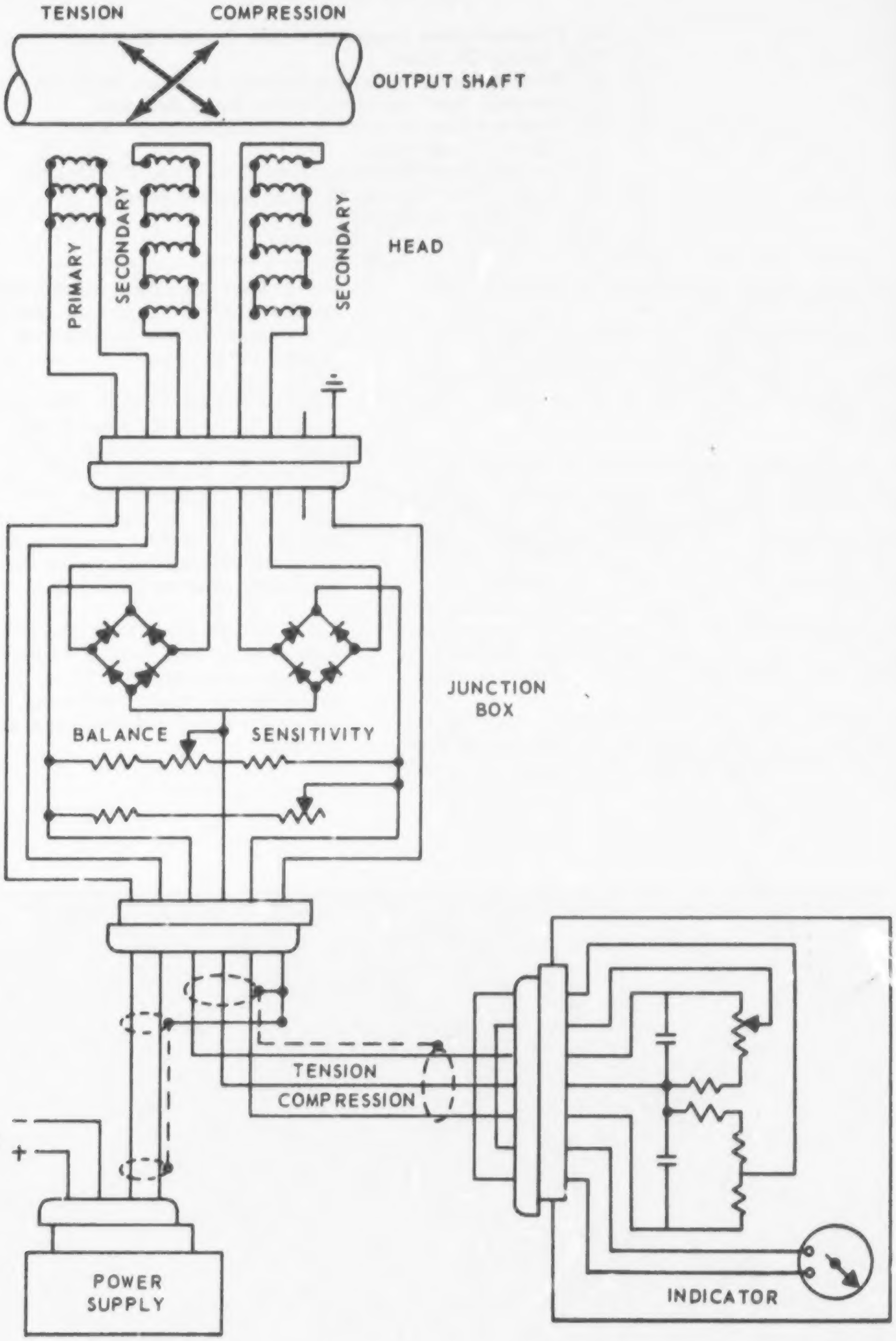


Figure 1-16. Torque System Components (T53-L-701)


TENSION
COMPRESSION
OUTPUT SHAFT
PRIMARY
SECONDARY
SECONDARY
HEAD
JUNCTION BOX
BALANCE
SENSITIVITY
TENSION
COMPRESSION
28VDC
+
POWER SUPPLY
INDICATOR
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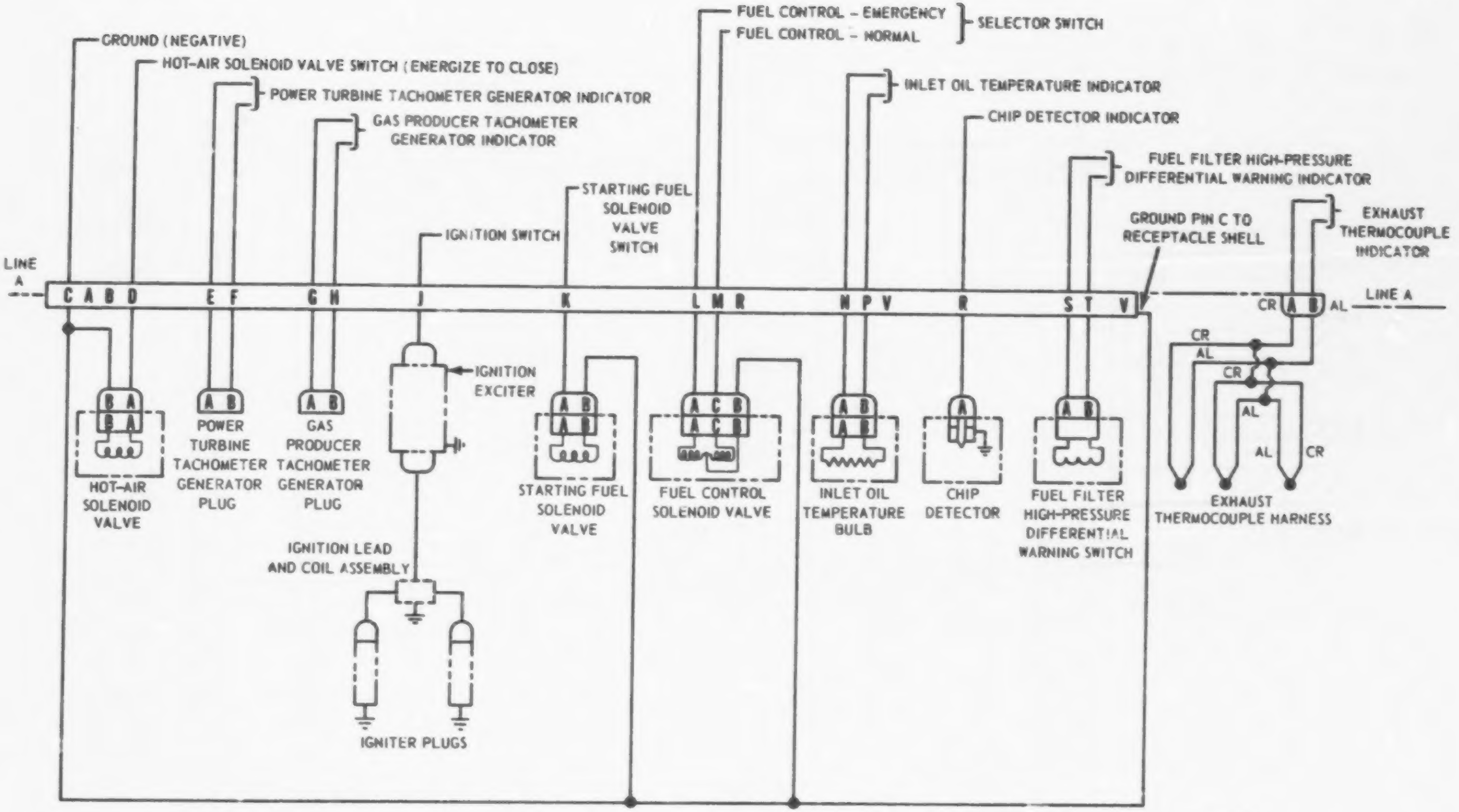
XA-0

Figure 1-17. Electrical Torquemeter System Schematic (T53-L-701)


GROUND (NEGATIVE)
HOT-AIR SOLENOID VALVE SWITCH (ENERGIZE TO CLOSE)
POWER TURBINE TACHOMETER GENERATOR INDICATOR
GAS PRODUCER TACHOMETER GENERATOR INDICATOR
IGNITION SWITCH
STARTING FUEL SOLENOID VALVE SWITCH
FUEL CONTROL - EMERGENCY
FUEL CONTROL - NORMAL
SELECTOR SWITCH
INLET OIL TEMPERATURE INDICATOR
CHIP DETECTOR INDICATOR
FUEL FILTER HIGH-PRESSURE DIFFERENTIAL WARNING INDICATOR
GROUND PIN C TO RECEPTACLE SHELL
EXHAUST THERMOCOUPLE INDICATOR
LINE A
C A B D
E F
G H
J
K
L M R
N P V
R
S T
V
LINE A
CR
A B
AL
B A
B A
HOT-AIR SOLENOID VALVE
A B
POWER TURBINE TACHOMETER GENERATOR PLUG
A B
GAS PRODUCER TACHOMETER GENERATOR PLUG
IGNITION EXCITER
IGNITION LEAD AND COIL ASSEMBLY
IGNITER PLUGS
A B
A B
STARTING FUEL SOLENOID VALVE
A C B
A C B
FUEL CONTROL SOLENOID VALVE
A B
A B
INLET OIL TEMPERATURE BULB
A
CHIP DETECTOR
A B
FUEL FILTER HIGH-PRESSURE DIFFERENTIAL WARNING SWITCH
CR
AL
CR
AL
AL
CR
EXHAUST THERMOCOUPLE HARNESS
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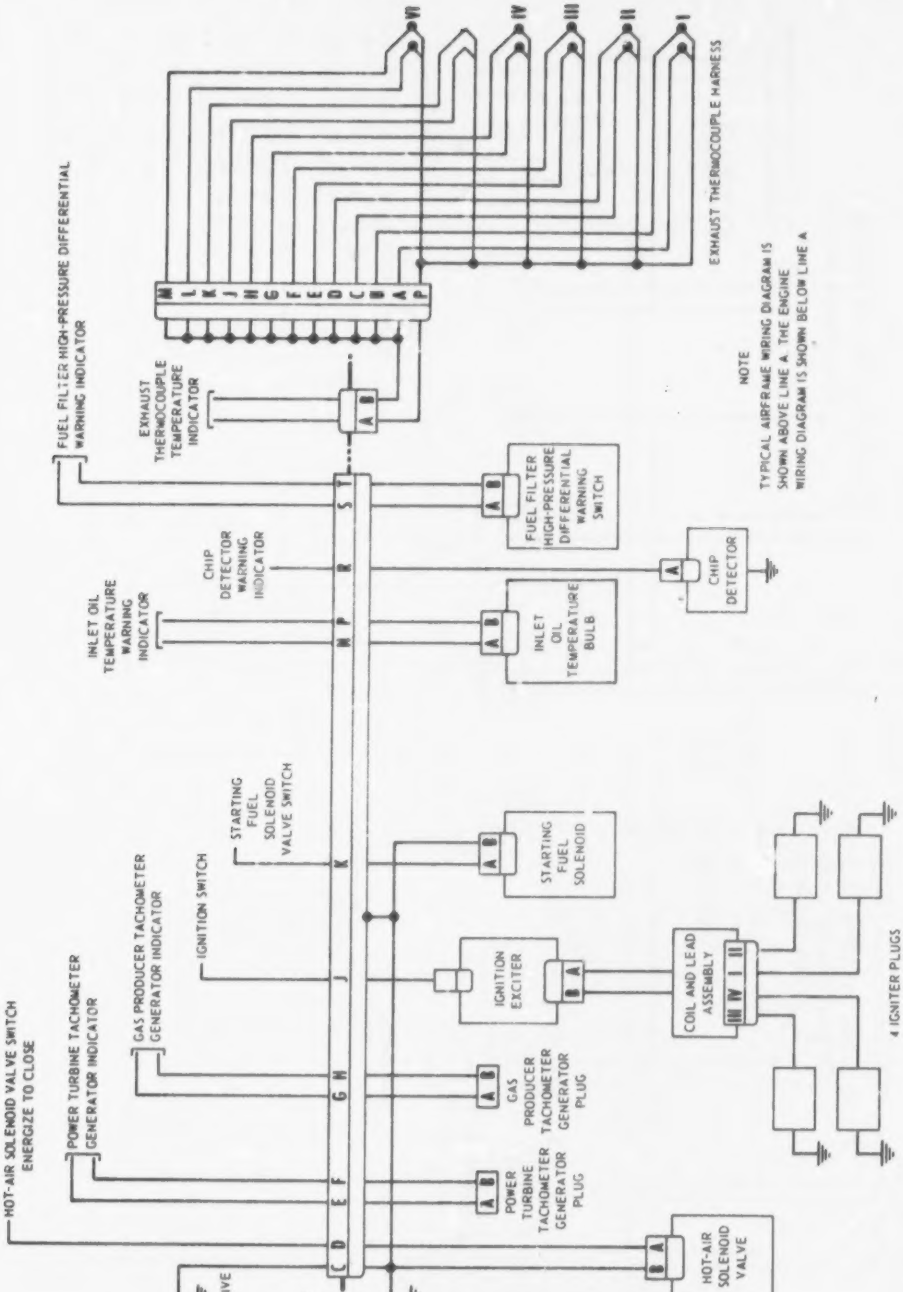
XA-854

NOTE
TYPICAL AIRFRAME WIRING DIAGRAM IS SHOWN ABOVE LINE A. THE ENGINE WIRING DIAGRAM IS SHOWN BELOW LINE A.

Figure 1-18. Electrical System Schematic (T53-L-7/7A)


HOT-AIR SOLENOID VALVE SWITCH ENERGIZE TO CLOSE
POWER TURBINE TACHOMETER GENERATOR INDICATOR
GAS PRODUCER TACHOMETER GENERATOR INDICATOR
IGNITION SWITCH
STARTING FUEL SOLENOID VALVE SWITCH
INLET OIL TEMPERATURE WARNING INDICATOR
CHIP DETECTOR WARNING INDICATOR
FUEL FILTER HIGH-PRESSURE DIFFERENTIAL WARNING INDICATOR
EXHAUST THERMOCOUPLE TEMPERATURE INDICATOR
NEGATIVE
LINE A
C D E F G H J K N P R S T
A B
M L K J H G F E D C B A P
VI V IV III II I
HOT-AIR SOLENOID VALVE
POWER TURBINE TACHOMETER GENERATOR PLUG
GAS PRODUCER TACHOMETER GENERATOR PLUG
IGNITION EXCITER
COIL AND LEAD ASSEMBLY
III IV I II
4 IGNITER PLUGS
STARTING FUEL SOLENOID
INLET OIL TEMPERATURE BULB
CHIP DETECTOR
FUEL FILTER HIGH-PRESSURE DIFFERENTIAL WARNING SWITCH
EXHAUST THERMOCOUPLE HARNESS

NOTE
TYPICAL AIRFRAME WIRING DIAGRAM IS SHOWN ABOVE LINE A. THE ENGINE WIRING DIAGRAM IS SHOWN BELOW LINE A.

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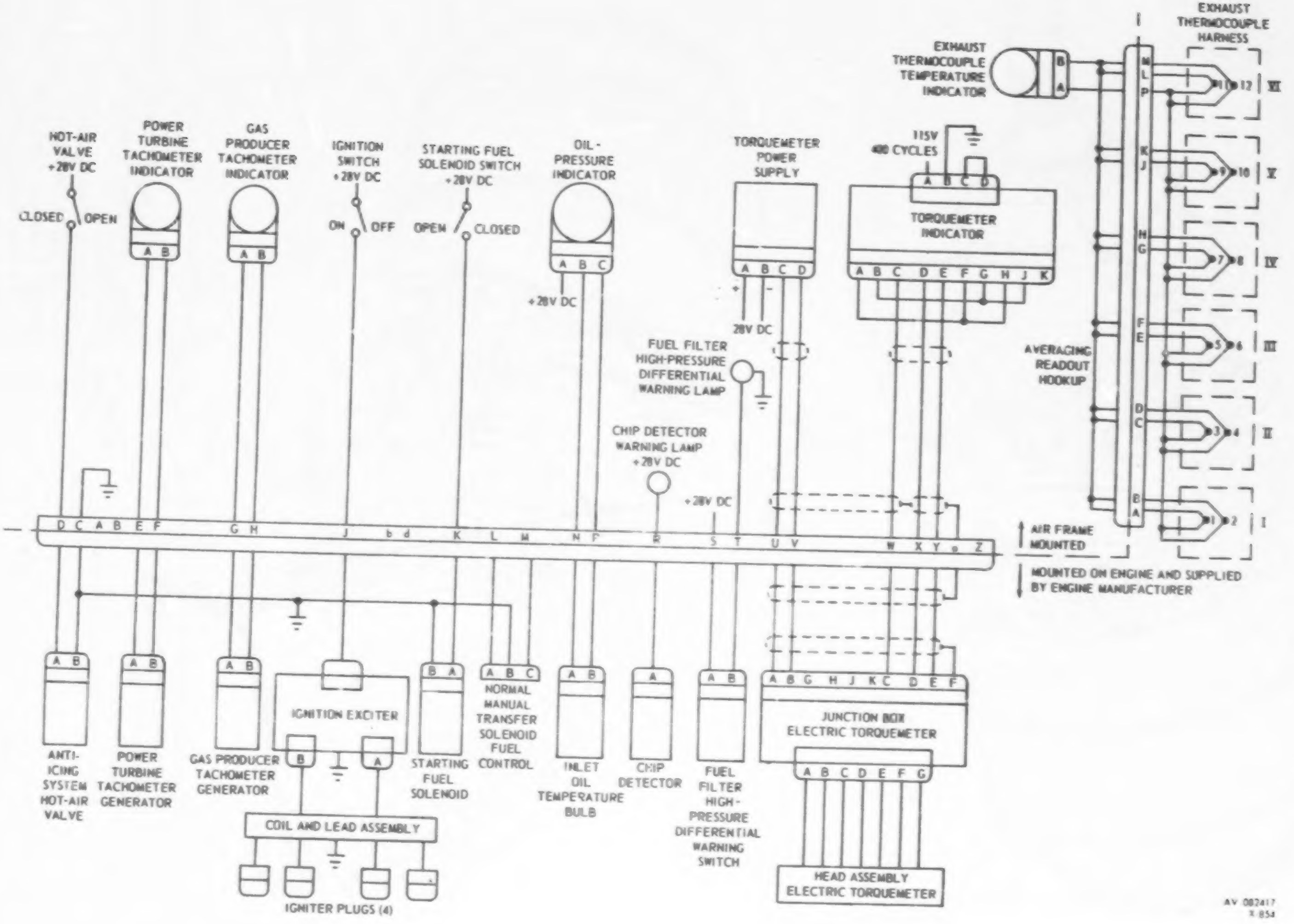
EXHAUST THERMOCOUPLE HARNESS
EXHAUST THERMOCOUPLE TEMPERATURE INDICATOR
B
A
N
L
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F
E
D
C
B
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7
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9
10
11
12
I
II
III
IV
V
VI
AVERAGING READOUT HOOKUP
AIR FRAME MOUNTED
MOUNTED ON ENGINE AND SUPPLIED BY ENGINE MANUFACTURER
115V 400 CYCLES
TORQUEMETER INDICATOR
A B C D
A B C D E F G H J K
TORQUEMETER POWER SUPPLY
A B C D
+
-
28V DC
FUEL FILTER HIGH-PRESSURE DIFFERENTIAL WARNING LAMP
CHIP DETECTOR WARNING LAMP +28V DC
+28V DC
HOT-AIR VALVE +28V DC
CLOSED
OPEN
POWER TURBINE TACHOMETER INDICATOR
A B
GAS PRODUCER TACHOMETER INDICATOR
A B
IGNITION SWITCH +28V DC
ON
OFF
STARTING FUEL SOLENOID SWITCH +28V DC
OPEN
CLOSED
OIL-PRESSURE INDICATOR
A B C
+28V DC
D C A B E F G H J b d K L M N P R S T U V W X Y a Z
A B
ANTI-ICING SYSTEM HOT-AIR VALVE
A B
POWER TURBINE TACHOMETER GENERATOR
A B
GAS PRODUCER TACHOMETER GENERATOR
IGNITION EXCITER
B
A
COIL AND LEAD ASSEMBLY
IGNITER PLUGS (4)
B A
STARTING FUEL SOLENOID
A B C
NORMAL MANUAL TRANSFER SOLENOID FUEL CONTROL
A B
INLET OIL TEMPERATURE BULB
A
CHIP DETECTOR
A B
FUEL FILTER HIGH-PRESSURE DIFFERENTIAL WARNING SWITCH
A B G H J K C D E F
JUNCTION BOX ELECTRIC TORQUEMETER
A B C D E F G
HEAD ASSEMBLY ELECTRIC TORQUEMETER
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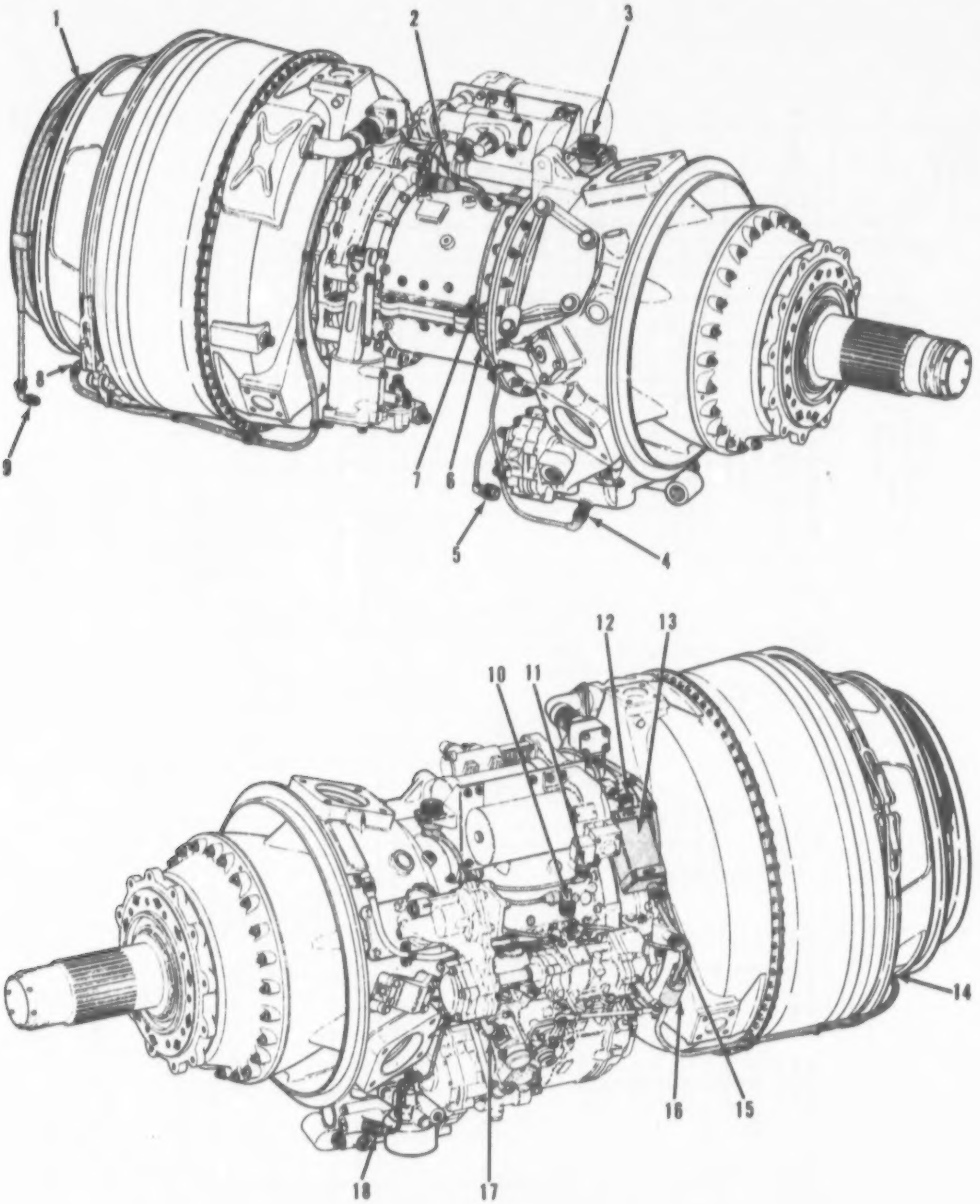
Figure 1-20. Electrical System Schematic (T53-L-701)



- *1. Exhaust Thermocouple Harness
- 2. Hot-Air Solenoid Valve Connector
- 3. Airframe Main Connector
- 4. Chip Detector Connector
- 5. Compressor Rotor Tachometer Generator Connector
- 6. Wiring Harness
- 7. Clamp (Typical)
- 8. Igniter Plug Connector
- 9. Exhaust Thermocouple Connector
- 10. Power Turbine Tachometer Generator Connector
- 11. Fuel Filter Pressure Switch Connector
- 12. Ignition Unit Input Connector
- 13. Ignition Unit
- 14. Left Igniter Plug Connector
- 15. Starting Fuel Solenoid Valve Connector
- 16. Ignition Lead and Coil Assembly
- 17. Fuel Control Solenoid Valve Connector
- 18. Oil Temperature Bulb and Connector

*Not supplied as part of Wiring Harness.

Figure 1-21. Electrical System External Components (T53-L-7/7A)

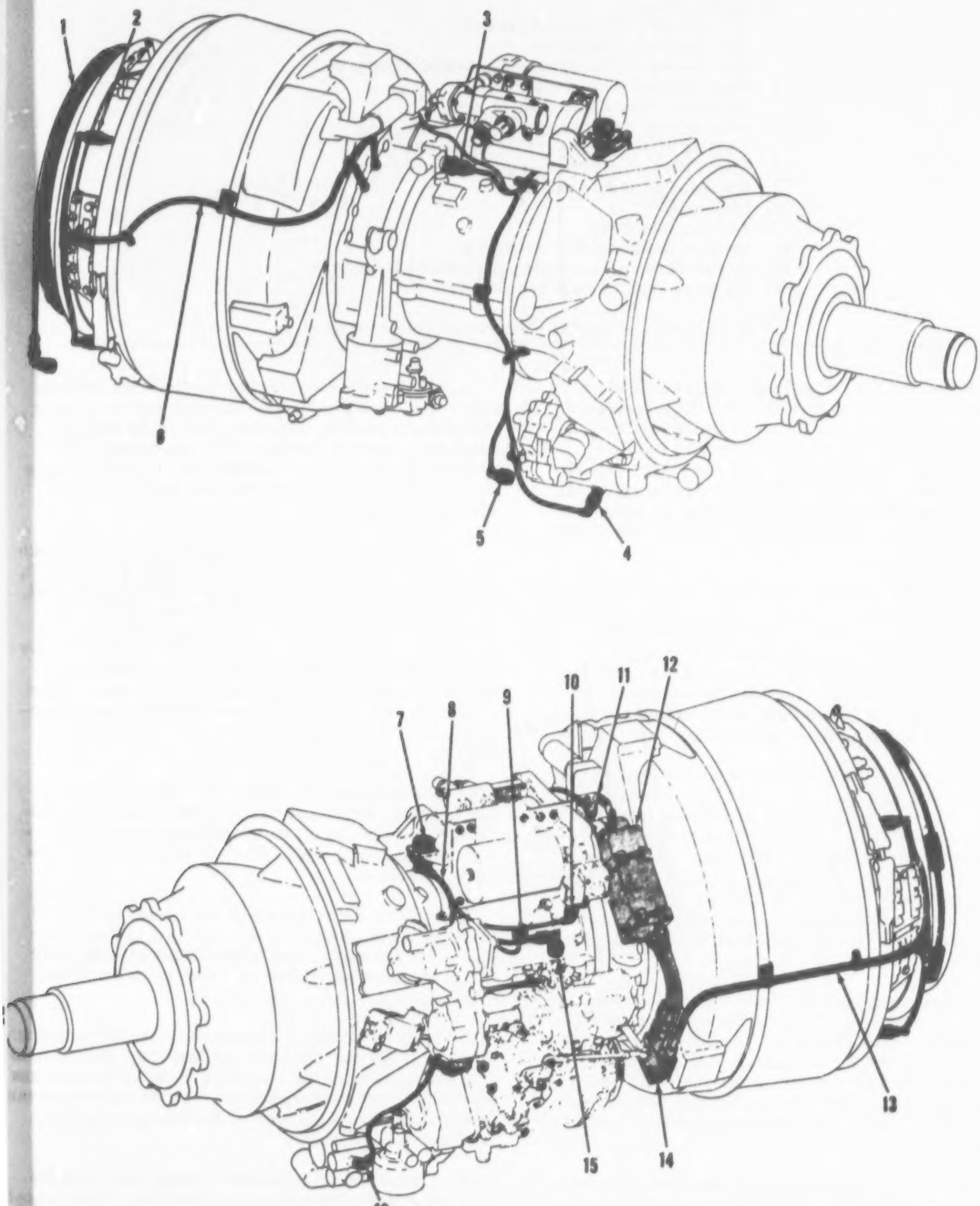

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Figure 1-22. Electrical System External Components (T53-L-15)

Key to Figure 1-22.

*1. Exhaust Thermocouple Assembly
2. Igniter Plug
3. Hot-Air Solenoid Valve Connector
4. Chip Detector Connector
5. Gas Producer Tachometer Generator Connector
6. Right Ignition Lead
7. Airframe Main Connector
8. Main Wiring Harness
9. Starting Fuel Solenoid Valve Connector
10. Fuel Filter Pressure Switch Connector
11. Ignition Unit Input Connector
12. Ignition Unit
13. Left Ignition Lead
14. Ignition Lead and Coil Assembly
15. Power Turbine Tachometer Generator Connector
16. Oil Temperature Bulb and Connector

*Not supplied as part of Electrical Cable Assembly.

1-84. FUEL FILTER PRESSURE SWITCH. (See figures 1-21 through 1-23.) The fuel filter pressure switch and connector (11 or 10) is located on base of main fuel filter. This switch, actuated by an increased pressure differential (0.8 psi) between fuel-in and fuel-out ports (caused by filter contamination) gives approximately 4 hours warning of an impending bypass condition. Filter shall be replaced only under these conditions.

1-85. EXHAUST THERMOCOUPLE ASSEMBLY. The engine is provided with either a three-probe (T53-L-7/7A) or six-probe (T53-L-15/701) thermocouple harness assembly. The harness, consisting of an electrical connector, shielded manifold, and chromel/alumel thermocouples, is inserted through exhaust diffuser into path of exhaust gas and transmits voltage generated by thermocouples to a cockpit indicator.

1-86. INTERNAL COOLING AND PRESSURIZATION SYSTEM. (See figures 1-24 and 1-25.) Internal cooling and pressurization air is obtained from five sources; through fourth stage spacer area, from edge of combustion chamber deflector, from tip of centrifugal compressor impeller through first (T53-L-7/7A engines), or first and second (T53-L-15/701 engines) stage gas producer nozzle assemblies, and from external air through hollow struts of exhaust diffuser.

1-87. Compressed air, bled from tip of centrifugal compressor impeller, cools the forward face of diffuser housing, and pressurizes the No. 2 bearing forward and aft seals. It then passes through a series of holes through the rear compressor shaft into space between the compressor rotor assembly and power shaft where it splits into three separate flow paths as follows:

a. Some of the compressed air flows forward over the power shaft and into center of the seal behind the No. 1 bearing and to the intershaft seal, located forward of No. 1 bearing.

b. Some of the compressed air flows aft over th
power shaft and emerges at the back end of the rea
compressor shaft to cool rear face of the second
stage gas producer turbine rotor, the forward face
of the first stage power turbine rotor, and first sta
power turbine nozzle. The air then passes into the
exhaust stream.

c. The remainder of compressed air flows t
a series of holes into power shaft. This air flows
through a hole drilled in the power shaft through be
and into hollow interior of second stage power turbine rotor assembly. Air then passes through a
series of holes in the rotor assembly to cool rear s
face of first stage power turbine rotor assembly,
forward surface of second stage power turbine roto
assembly, and both faces of second stage gas produ
er nozzle. The air then passes into the exhaust
stream.

1-88. Compressed air, bled from edge of combustion chamber deflector, cools forward face of the de
flector, and passes through and cools the No. 2 bea
ing housing and aft seal. The air splits into two flo
paths as follows:

a. Some of the compressed air cools the forwar
face and blade roots of first stage gas producer turbine rotor assembly, and forward face of first stag
gas producer sealing disc, and then passes into the
exhaust stream.

b. The remainder of compressed air flows thro
the first stage gas producer turbine rotor assembly
cool lower parts of the rear face of the first stage
producer turbine rotor, and out into the exhaust str
through the inner diameter of the second stage gas
producer turbine rotor.

1-89. Compressed air passes through and cools th
first stage gas producer nozzle assembly, then thro
the inner shroud and deflector of the first stage ga
producer nozzle assembly, and into the exhaust

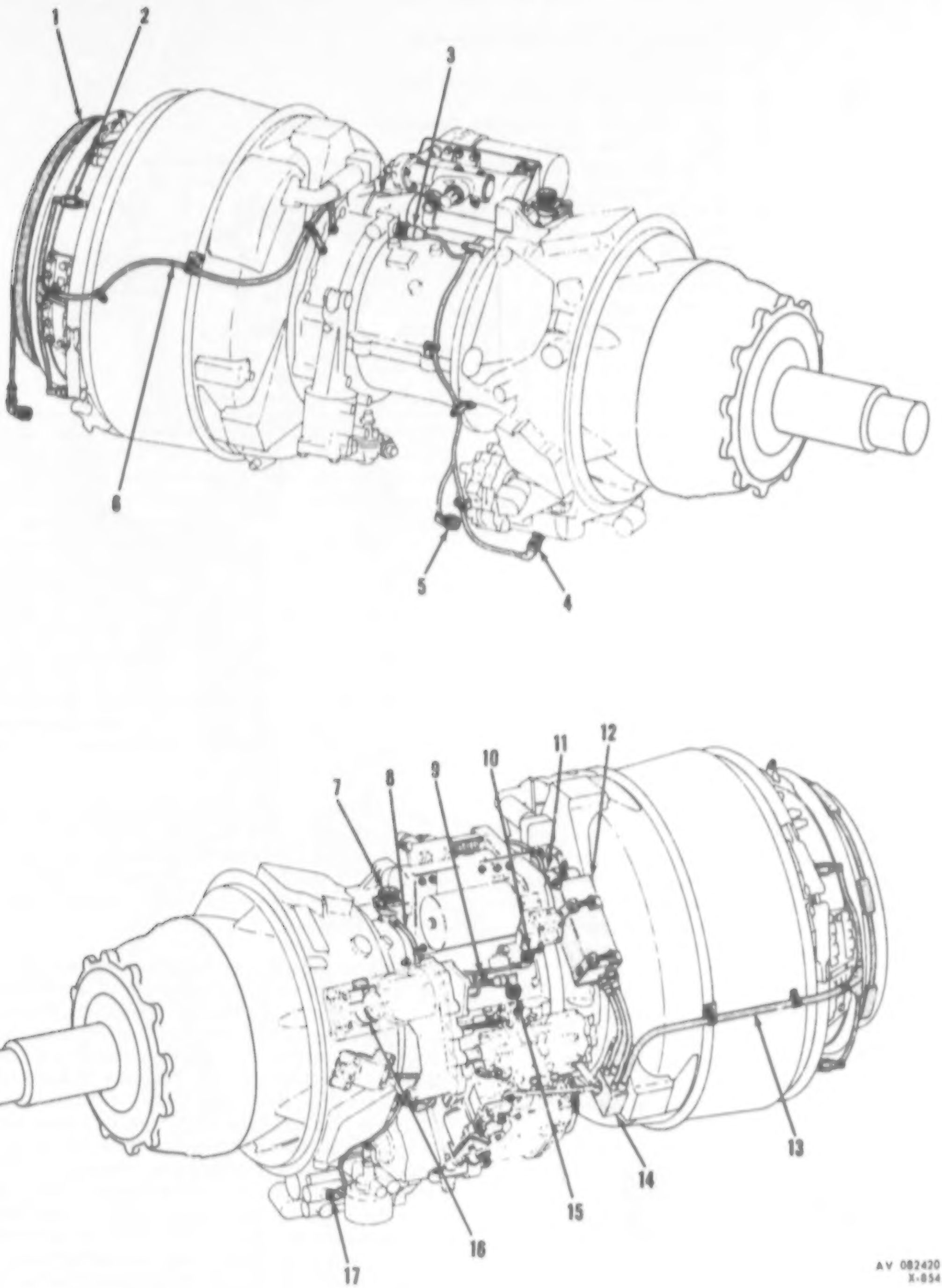
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Figure 1-23. Electrical System External Components (T53-L-701)

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Key to Figure 1-23.

*1. Exhaust Thermocouple Assembly
2. Igniter Plug
3. Hot-Air Solenoid Valve Connector
4. Chip Detector Connector
5. Gas Producer Tachometer Generator Connector
6. Right Ignition Lead
7. Airframe Main Connector
8. Main Wiring Harness
9. Starting Fuel Solenoid Valve Connector
10. Fuel Filter Pressure Switch Connector
11. Ignition Unit Input Connector
12. Ignition Unit
13. Left Ignition Lead
14. Ignition Lead and Coil Assembly
15. Power Turbine Tachometer Generator Connector
16. Electrical Torquemeter Junction Box
17. Oil Temperature Bulb and Connector

*Not supplied as part of Electrical Cable Assembly

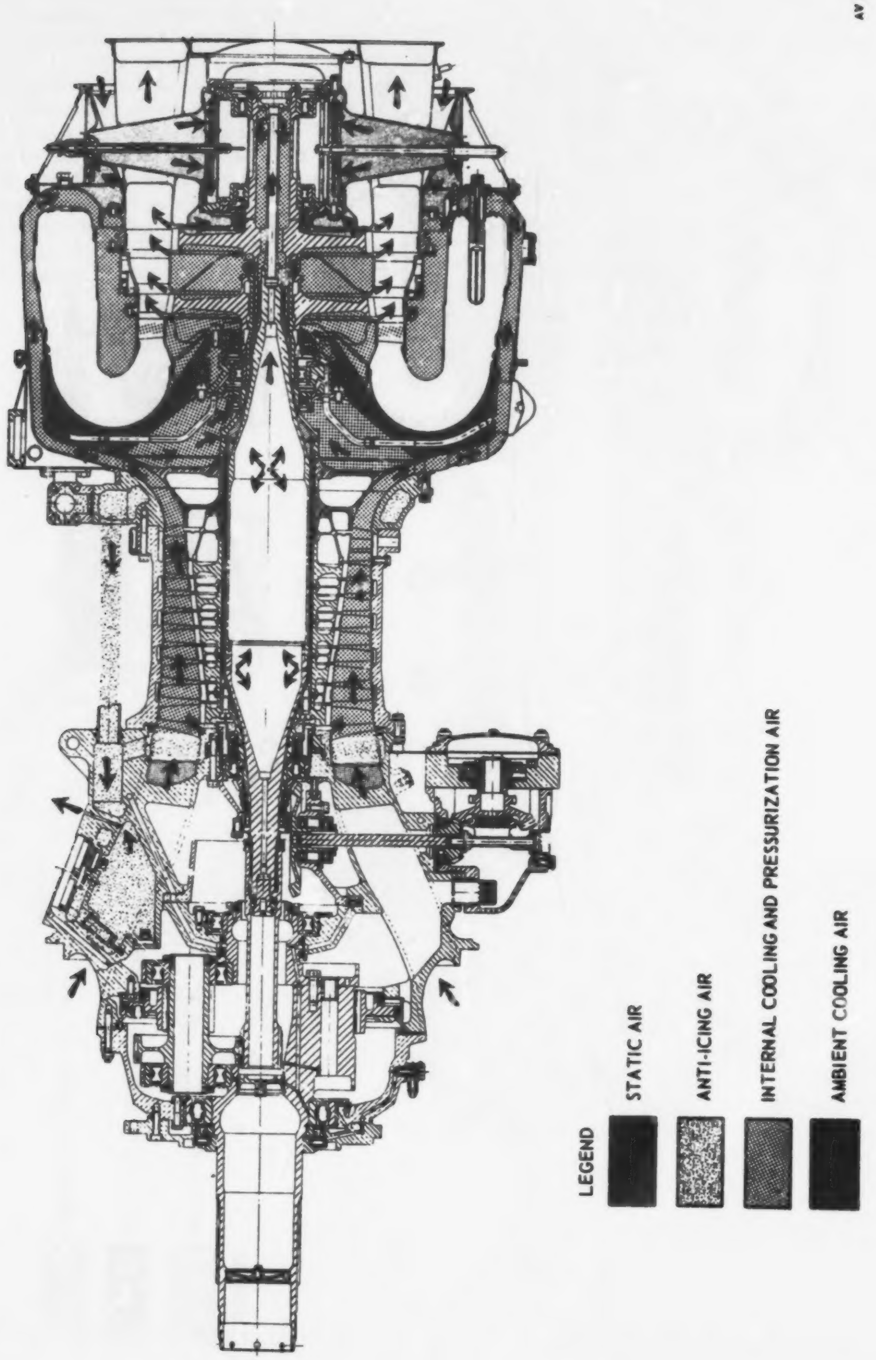
stream. Compressed air passes through holes in the second stage gas producer nozzle assembly and between two inner deflectors, and then out to cool the rear face of the first stage gas producer rotor assembly, front face of the second stage gas producer turbine rotor assembly, and out into the exhaust stream. Ambient air enters the exhaust diffuser struts, and passes through the exhaust diffuser support cone into the area around the No. 3 and 4 bearing housing. The cooling air moves forward over No. 3 and 4 bearings housing, and past the rear face of second stage power turbine rotor assembly, and into the exhaust stream. Compressed air is bled in through holes in the fourth stage spacer and into the area between the disc bores and the compressor sleeve. The air then passes forward along the compressor sleeve to the first stage disc. The air passes up through slots in the first and second stage discs, and through holes in the first stage spacer and into inlet air stream. A seal is located between the centrifugal compressor impeller compressor sleeve. This seal prevents high-temperature air, which bleeds through the aft face of the impeller, from entering the compressor disc area.

1-90. ANTI-ICING SYSTEM. (See figure 1-26.) Pressurized hot air from the air diffuser flows through holes in the trailing edge of diffuser vanes, and collects in the air diffuser internal bleed air manifold, where it is passed to an external bleed air manifold (1), located at the 1-o'clock position on the diffuser housing. An elbow (2) and tube (3) are connected to the external bleed air manifold, and to an adapter assembly (4) on top of the impeller housing. The adapter delivers air through the impeller housing to the hot-air solenoid valve (5) and serves as a source of customer air. The hot-air solenoid valve (5) is mounted on forward face of compressor and impeller housing assembly. The solenoid-operated valve controls the flow of anti-icing hot air from the diffuser housing to the inlet housing to prevent formation of ice. During engine operation, the valve is normally energized in the CLOSED position. When anti-icing air is required, the valve is deenergized to OPEN position by manually activating a switch in the cockpit. In event of electrical power failure, the fail-safe, spring-loaded valve returns to OPEN position to provide continuous anti-icing air. After leaving the hot air solenoid valve, anti-icing air flow forward through the air regulator tube (6) and into th inlet housing port (7) on top of inlet housing. This anti-icing air is then circulated through five of the six hollow inlet housing support struts to prevent ice formation in the inlet housing area. Anti-icing air also flows into the annulus in the rear of the inlet housing where it passes through the hollow inlet guid vanes to prevent icing. After passing through inlet guide vanes, the air exits in front of inlet guide vane and flows into the compressor area. Hot scavenge oil draining through the lower strut into the accessory drive gearbox prevents ice formation in the bottom of inlet housing area.

1-91. INTERSTAGE AIRBLEED SYSTEM. (See figures 1-27 and 1-28.) The interstage airbleed system is provided to facilitate acceleration of the compressor rotor assembly. Principal components of the system are an interstage bleed actuator and a bleed band assembly.

1-92. Interstage Bleed Actuator. (See figure 1-27.) The interstage bleed actuator (3) is mounted on righ side of compressor housing assembly. Operation of the airbleed actuator is controlled by a signal from t fuel control assembly. When control valve in the fue control assembly is open, one side of diaphragm ven at atmosphere (P_A). (See figure 1-28.) Air from th compressor discharge (P_3) creates a pressure drop across diaphragm allowing actuator valve to open, venting the actuator housing to atmosphere (P_A). Th spring-loaded actuator piston moves down, opening bleed band. When the control valve in the fuel control assembly is closed, pressure on both sides of diaphragm will be equal, and the differential of diaphragm areas will close the actuator valve. Air from compressor discharge (P_3) enters actuator housing. The actuator piston moves up, closing bleed band.

1-93. Bleed Band Assembly. (See figure 1-27.) Th bleed band assembly (1) consists of two band halves bolted together. It is positioned around rear portion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LEGEND
STATIC AIR
ANTI-ICING AIR
INTERNAL COOLING AND PRESSURIZATION AIR
AMBIENT COOLING AIR

Figure 1-24. Internal Cooling, Pressurization, and Anti-Icing Air Flow (T53-L-7/7A)

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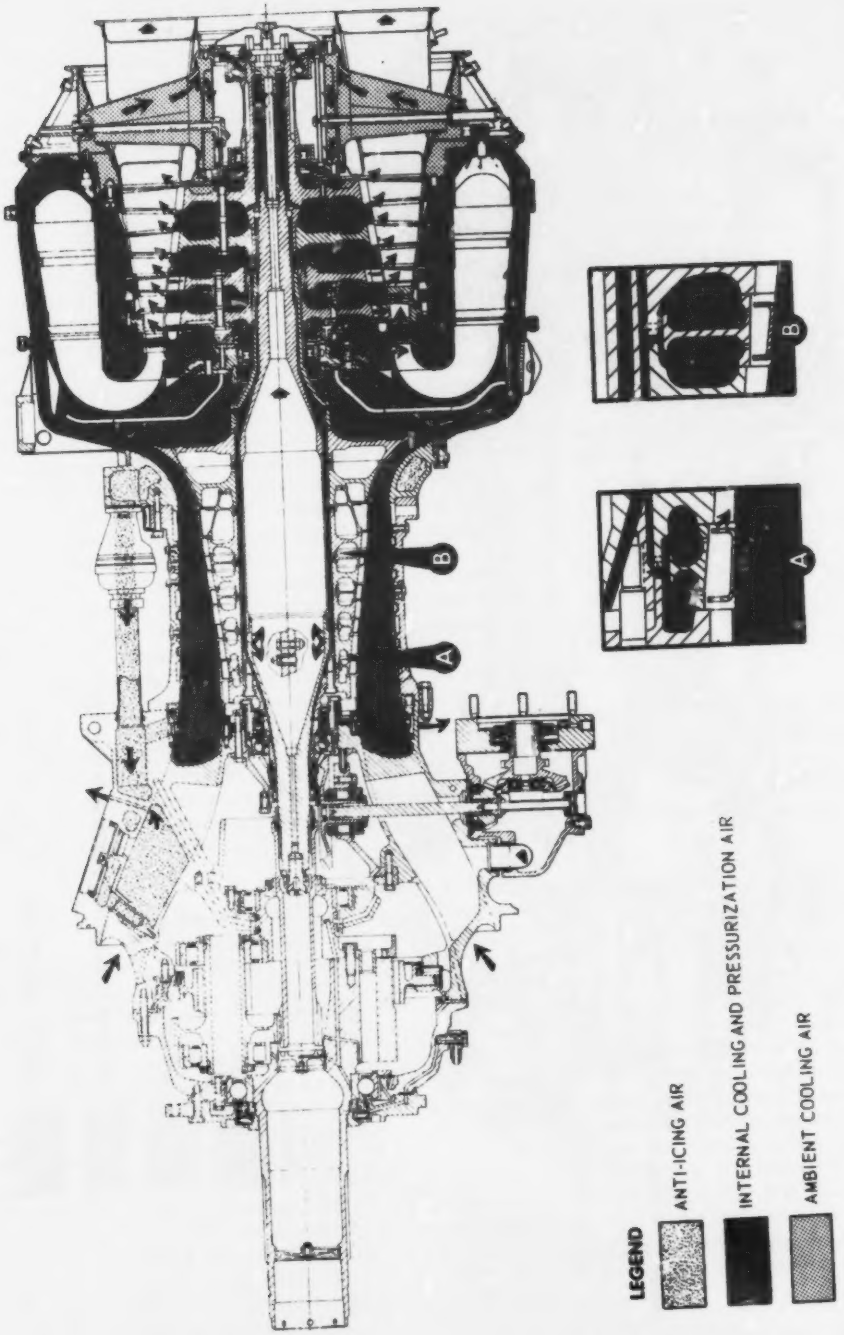
A
B
A
B
LEGEND
ANTI-ICING AIR
INTERNAL COOLING AND PRESSURIZATION AIR
AMBIENT COOLING AIR
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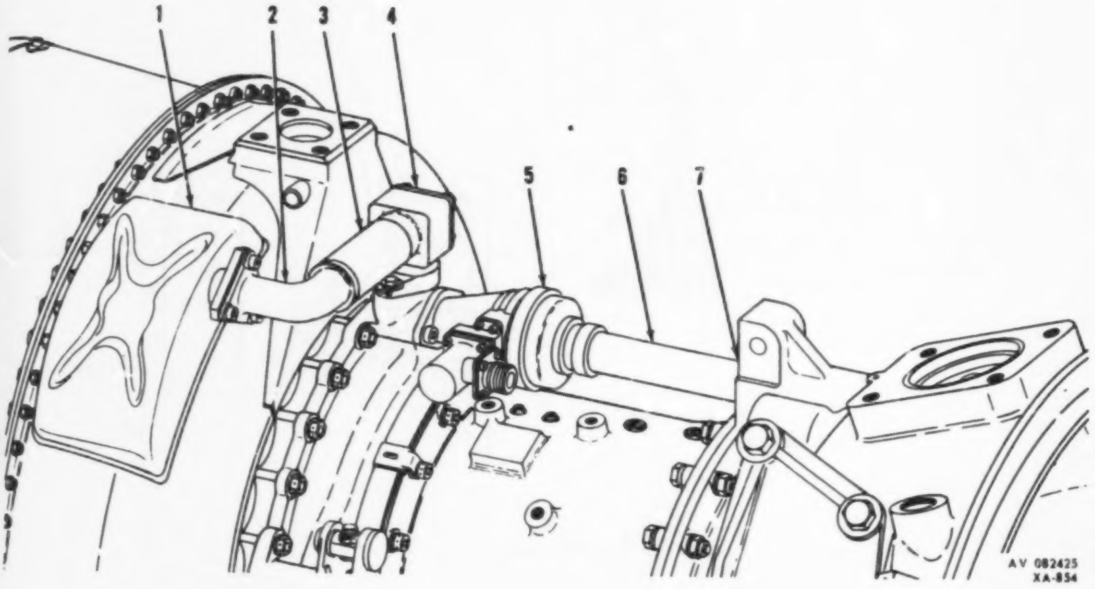
of the axial compressor housings, and secured by clips to the compressor housings. The looped ends of the bleed band assembly are attached to the air-bleed actuator.

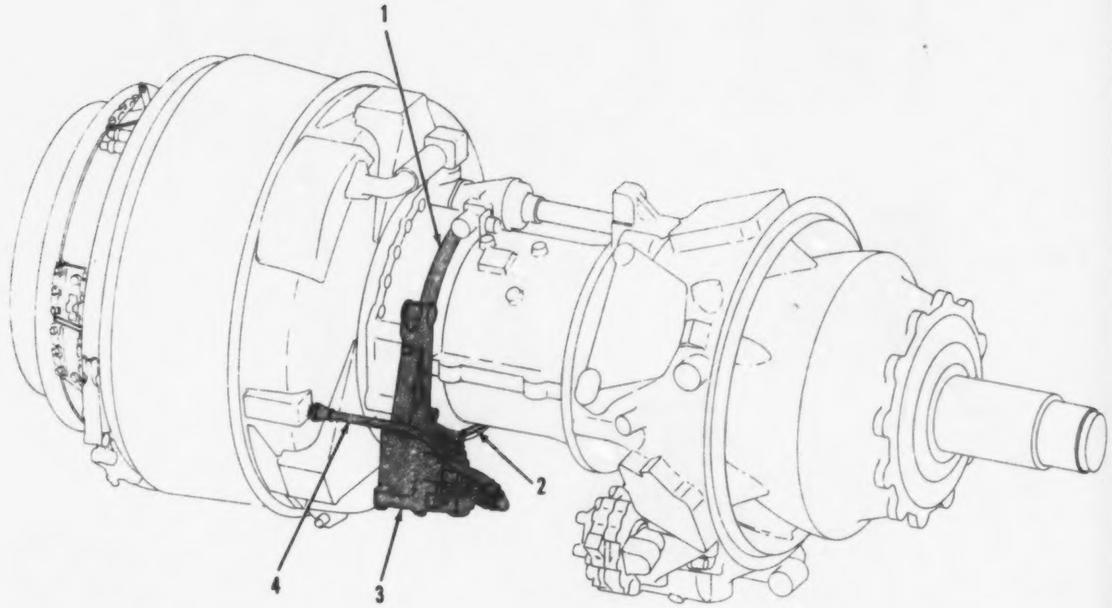
1-94. VARIABLE INLET GUIDE VANE SYSTEM (T53-L-15/701 Engines). Variable inlet guide vanes change angle of incidence between inlet air and first compressor rotor blades to maintain airflow requirements of the compressor rotor assembly. At low N1 speed, (0 to 80 percent) during standard day sea level conditions, vanes are in a closed position. The N1 speed at which the inlet guide vanes start to open and the speed at which they are fully open varies with ambient temperature. Inlet guide vanes are positioned by the inlet guide vane actuator through a synchronizing ring. The position of the inlet guide vane actuator or piston is controlled by the inlet guide vane actuator pilot valve, located in the fuel control, as a function of N1 speed and compressor inlet temperature. While positioning guide vanes, the actuator relays changes in its position back to the fuel control through an external feedback control rod. This acts to nullify the fuel-out pressure signal so that at any steady state N1 speed between 80 and 95 percent at standard day conditions the inlet guide vanes assume a constant position.

1-95. Inlet Guide Vane Actuator. (See figures 1-29 and 1-30.) The inlet guide vane actuator (5, figure 1-29) is mounted on right side of compressor housing assembly at the front flange. Fuel seal leakage is drained through the hose (4), and out the starter-generator drive seal drain port on the accessory drive gearbox. The actuator is operated by servo pressure from the fuel control.



1. Air Diffuser External Bleed Air Manifold
2. Elbow
3. Tube
4. Customer Bleed Air Adapter Assembly
5. Hot-Air Solenoid Valve
6. Anti-Icing Air Regulator Tube
7. Inlet Housing Port

Figure 1-26. Anti-Icing System External Components



1. Bleed Band Assembly
2. Fuel Control to Interstage Bleed Actuator Air Pressure Hose
3. Interstage Bleed Actuator
4. Air Diffuser to Interstage Bleed Actuator Air Pressure Hose

Figure 1-27. Interstage Bleed System External Components

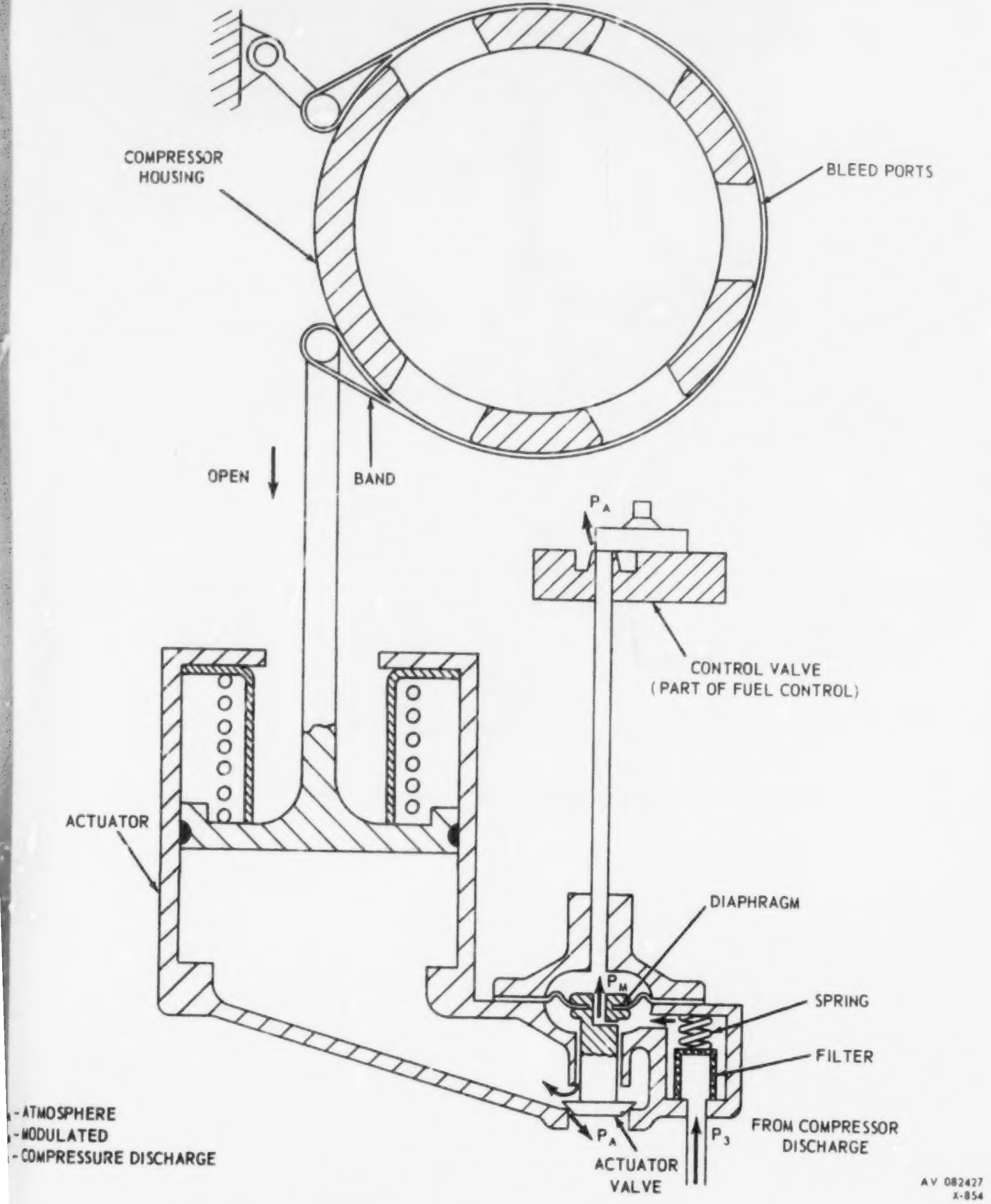

COMPRESSOR HOUSING
BLEED PORTS
OPEN
BAND
P_A
CONTROL VALVE (PART OF FUEL CONTROL)
ACTUATOR
DIAPHRAGM
P_M
SPRING
FILTER
-ATMOSPHERE
-MODULATED
-COMPRESSURE DISCHARGE
P_A
ACTUATOR VALVE
P_3
FROM COMPRESSOR DISCHARGE
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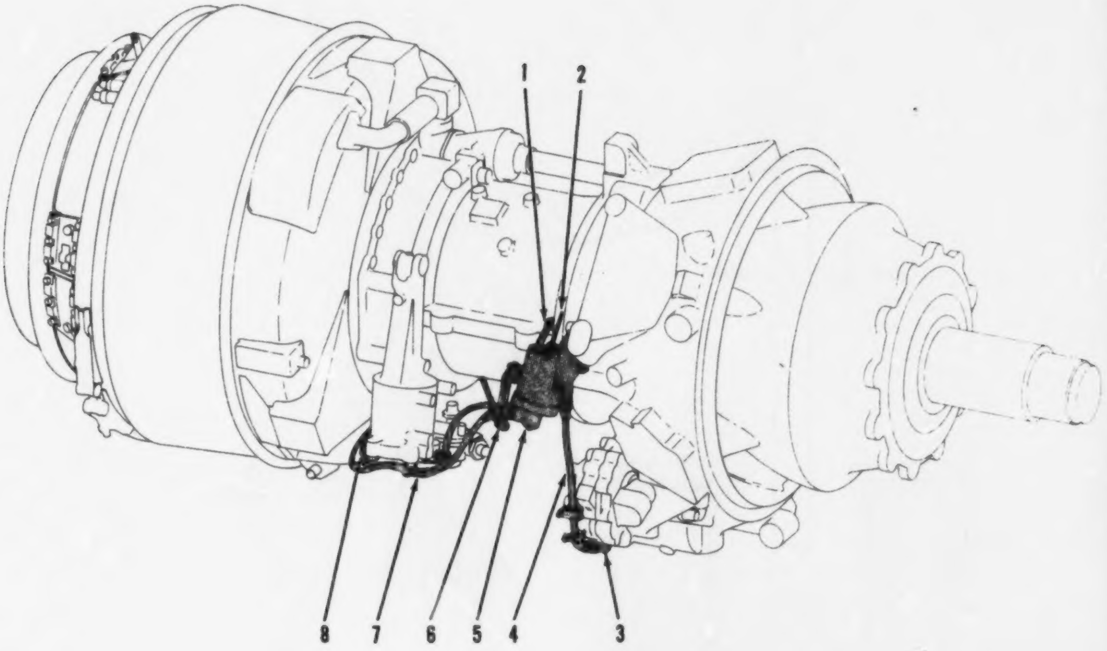
Figure 1-28. Interstage Bleed System Diagram



1. Control Rod Index Plate
2. Inlet Guide Vane Actuator Control Rod
3. Inlet Guide Vane Seal Drain Connector
4. Seal Drain Hose
5. Inlet Guide Vane Actuator
6. Feedback Control Rod
7. Fuel Control to Inlet Guide Vane Actuator Opening Hose
8. Fuel Control to Inlet Guide Vane Actuator Closing Hose

Figure 1-29. Variable Inlet Guide Vane System External Components

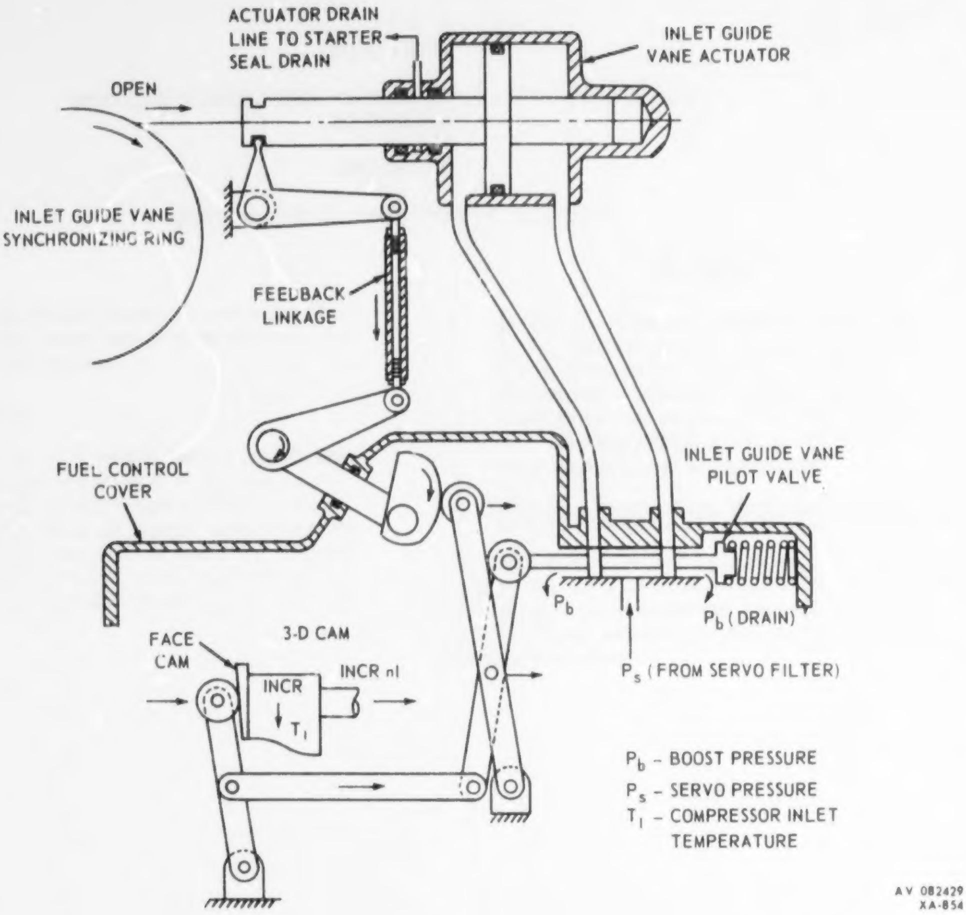

ACTUATOR DRAIN LINE TO STARTER SEAL DRAIN
INLET GUIDE VANE ACTUATOR
OPEN
INLET GUIDE VANE SYNCHRONIZING RING
FEEDBACK LINKAGE
FUEL CONTROL COVER
INLET GUIDE VANE PILOT VALVE
P_b
P_b (DRAIN)
P_s (FROM SERVO FILTER)
FACE CAM
3-D CAM
INCR nl
INCR
T_1
P_b - BOOST PRESSURE
P_s - SERVO PRESSURE
T_1 - COMPRESSOR INLET TEMPERATURE
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Figure 1-30. Inlet Guide Vane Control System Diagram

CHAPTER 2

SPECIAL TOOLS, TEST EQUIPMENT, AND CONSUMABLE MATERIALS

SECTION I

SPECIAL TOOLS AND TEST EQUIPMENT

2-1. GENERAL.

2-2. This section contains functional and numerical lists of all the special tools required to perform the work described in this manual.

2-3. USE OF TOOLS.

2-4. Use only plastic or rawhide (never metal) mallet heads when driving on any part of the engine. Never lift heavy parts by hand; use a chain or powered hoist and lifting yokes or slings. Apply an even pressure to all bearing pushers or pullers. Tighten jackscrews, attaching screws, bolts, and nuts in small increments, on opposite planes.

CAUTION

Do not use cadmium-plated tools for any of the disassembly or reassembly procedures given in this manual. Cadmium plating has a tendency to chip. If these chips enter the engine, they will contaminate the lubrication system and cause magnesium parts to deteriorate.

2-5. SPECIAL TOOL AND TEST EQUIPMENT LIST.

2-6. The tools and test equipment list, table 2-1, numerically lists tools and equipment used to perform the special procedures associated with the engine. Figure number, nomenclature, and part numbers are given.

Table 2-1. Special Tools and Test Equipment

FIGURE	NOMENCLATURE	PART NUMBER
2-1	Multimeter	AN/USM223
2-2	Jetcal Analyzer	BH112JA-36 replac by BH112JB-36
2-2	Junction Box	BH361-5 detail of BH16700 replaces BH361-8
2-3	Junction Box	BH361-8 replaced by BH361-5
2-3A	Junction Box	BH361-10
2-3B	Junction Box	BH361-12
2-2	Probe Assembly	BH996-40 detail of BH16700
2-4	Probe Assembly	BH7434-40
2-5	Probe Assembly	BH7434L-40
2-6	Probe Assembly	BH7434R-40
2-48A	Filter, 70-cps	CEC1-003-0070 detail of LTCT484
2-48A	Filter, 200-cps	CEC1-003-0200 detail of LTCT484
2-48A, 10-1A	Vibration Meter	CEC1-117-0105 detail of LTCT484
2-157A	Vibration Meter	CEC1-157-0103 detail of LTCT2059
2-48A, 2-157A	Vibration Pickup	CEC4-118-0107 detail of LTCT484. and LTCT20596
2-6A	Vibration Pickup	CEC4-128-0101
2-48A, 2-157A	Cable Assembly	CEC49657-0300 detail of LTCT484 and LTCT20596
7-95	Spanner Wrench	GGG-W-665B Type II
2-6B	Thread Tap	GGG-T-70
2-7	Holding Fixture	LTCT40
2-8	Holding Fixture	LTCT44 replaced by LTCT4904
3-18	Locating Bar	LTCT153

Table 2-1. Special Tools and Test Equipment (Cont)

FIGURE	NOMENCLATURE	PART NUMBER
2-9	Combustor Lifting Adapter	LTCT53 replaced by LTCT3665
2-10	Wrench	LTCT57
2-11	Holding Fixture	LTCT58
2-12	Bushing	LTCT68
2-12	Bushing	LTCT68-10 detail of LTCT68 replaced by LTCT3640
6-16	Puller	LTCT73 replaced by LTCT2023
2-13	Sling	LTCT87
2-14	Blade Removal Tool	LTCT90 replaced by LTCT1644
2-15	Lifting Fixture	LTCT91 replaced by LTCT3665
2-16	Bearing Puller	LTCT97 replaced by LTCT916
2-17	Installing Tool	LTCT99 replaced by LTCT501
2-18	Installing Tool	LTCT100
2-19	Removal Tool	LTCT101 replaced by LTCT3648
2-20	Spanner Wrench	LTCT107
2-21	Bolt	LTCT109 replaced by LTCT1429
6-6	Holding Fixture	LTCT115
6-7	Puller	LTCT142
3-18	Locating Button Bar	LTCT153
2-22	Propeller Plug Puller Assembly	LTCT177 replaced by LTCT2022
2-23	Support Ring	LTCT179

Table 2-1. Special Tools and Test Equipment (Cont)

FIGURE	NOMENCLATURE	PART NUMBER
3-32	Lifting Adapter	LTCT181
2-24	Handle	LTCT182 replaced by LTCT2019
2-25	Mechanical Puller	LTCT136 replaced by LTCT2013
8-45	Test Fixture	LTCT207
2-26	Wrench	LTCT213 replaced by LTCT2161
2-27	Wrench	LTCT214 replaced by LTCT1109
2-28	Wrench	LTCT215
2-29	Test Fixture	LTCT216
2-30	Fuel Harness Wrench	LTCT219 replaced by LTCT2051 and LTCT4810
6-15	Wrench	LTCT222
2-31	Bearing Removing Tool	LTCT231
2-32	Holding Fixture	LTCT247
3-16	Locking Plate	LTCT248
2-33	Pin Installer	LTCT256
3-35	Driver Wrench	LTCT258
2-34	Wrench	LTCT260 replaced by LTCT2127
2-35	Installer	LTCT270
2-36	Gearshaft Holder	LTCT277 replaced by LTCT2037
2-37	Holding Device	LTCT278 replaced by LTCT2044
2-38	Oil Flow Check Stand	LTCT313
8-21	Test Stand	LTCT314
8-10	Test Stand	LTCT315
8-9	Test Stand	LTCT316

Table 2-1. Special Tools and Test Equipment (Cont)

FIGURE	NOMENCLATURE	PART NUMBER
8-13	Test Stand	LTCT317
2-39	Console Tester	LTCT318
2-40	Fixture	LTCT324
8-18	Test Stand	LTCT340
2-41	Engine Sling	LTCT384 replaced by LTCT773
2-42	Drift	LTCT385 replaced by LTCT1643
2-43	Wrench	LTCT393
8-22	Plug	LTCT406
8-38	Test Fixture	LTCT409
8-37	Fixture Assembly	LTCT411 replaced by LTCT4100
2-44	Holding Fixture	LTCT413
2-45	Test Fixture	LTCT415
2-46	Test Stand	LTCT421
8-15	Test Stand	LTCT422
8-18	Adapter Assembly	LTCT423
10-1C	Adapter	LTCT428 detail of LTCT484
2-48A, 2-157A, 10-1C, 10-1D	Adapter	LTCT433 detail of LTCT484 and LTCT20596
2-47	(Deleted)	
2-48	Installing Tool	LTCT481
2-49	Installing and Removing Tool	LTCT482
2-48A	Vibration Check Tool Kit	LTCT484
3-43	Pin Removal Backup Tool	LTCT488 replaced by LTCT4895
2-50	Installing Tool	LTCT501 replaces LTCT99
2-51	Cone Removal Socket	LTCT502 replaced by LTCT674

Table 2-1. Special Tools and Test Equipment (Cont)

FIGURE	NOMENCLATURE	PART NUMBER
3-18	Alignment Tool	LTCT503
3-43	Drive Pin Punch	LTCT504 replaced by LTCT4895
3-16	Socket Wrench	LTCT505
2-52	Socket Wrench	LTCT506
3-22	Holding Fixture	LTCT508 replaced by LTCT860

Table 2-1. Special Tools and Test Equipment (Cont)

FIGURE	NOMENCLATURE	PART NUMBER
3-34	Tool Set	LTCT509
2-53	Cone Installation Tool	LTCT510 replaced by LTCT4013
2-54	Installation Tool	LTCT511
2-55	Installation and Removal Tool	LTCT519
2-56	Cup Installing Tool	LTCT525
2-48A, 2-157A, 10-1C, 10-1D	Adapter	LTCT535 detail of LTCT484 and LTCT20596
2-57	Removal Fixture	LTCT548
2-58	Hammer and Drift	LTCT552
2-59	Socket and Pilot Assembly	LTCT557
2-60	Socket Wrench Assembly	LTCT569
2-61	Holding Fixture	LTCT570
2-62	Test Fixture	LTCT571
2-63	Hub and Adapter Assembly	LTCT576 replaced by LTCT4533 and LTCT4676
2-139	Socket Wrench	LTCT584 detail of LTCT4676
2-138	Socket	LTCT587 detail of LTCT4675
7-107	Washer	LTCT610 detail of LTCT2125
7-107	Adapter	LTCT613 detail of LTCT2125
2-64	Gear Holding Ring Assembly	LTCT645 replaced by LTCT4016 and LTCT4018
2-65	Slide Hammer Assembly	LTCT674 replaces LTCT502 replaced by LTCT4069
2-66	Bearing Puller	LTCT675
2-67	Puller	LTCT691

Table 2-1. Special Tools and Test Equipment (Cont)

FIGURE	NOMENCLATURE	PART NUMBER
2-68	Backlash Gage	LTCT716
2-69	Mobile Trailer Assembly	LTCT744
2-70	Engine Sling	LTCT773 replaces LTCT384
7-79	Welding Fixture	LTCT780
7-80	Welding Fixture Stud	LTCT783 detail of LTCT780
2-71	Removal Tool	LTCT786 replaced by LTCT4677
2-72	Installing Tool	LTCT791
2-73	Gage	LTCT800
2-74	Puller	LTCT843
8-24	Test Fixture	LTCT859
2-75	Holding Fixture	LTCT860 replaces LTCT508 replaced by LTCT4675
2-76	Engine Intake Protector	LTCT862
8-5	(Deleted)	
8-17	Test Mounting Stand	LTCT865
8-27	Test Chamber	LTCT873
8-21	Assembly Adapter	LTCT887
8-11	Holding Fixture	LTCT896
2-77	Flow Test Rig	LTCT899
2-77	Primer Line	LTCT900 detail of LTCT899
8-40	Oil Nozzle Test Fixture	LTCT901 replaced by LTCT4495
2-78	Angle Bracket	LTCT910 replaced by LTCT3955
2-79	Wrench	LTCT915
2-80	Bearing Puller	LTCT916 replaces LTCT97

Table 2-1. Special Tools and Test Equipment (Cont)

FIGURE	NOMENCLATURE	PART NUMBER
2-81	Mechanical Puller	LTCT919 replaced by LTCT4680
3-25	Torque Adjustment Fixture	LTCT962
2-82	Wrench	LTCT1109 replaces LTCT214
2-83	Mechanical Puller	LTCT1218
2-84	Wrench	LTCT1409
8-19	Test Stand	LTCT1414
2-85	Bolt	LTCT1428
2-86	Bolt	LTCT1429 replaces LTCT109
8-10	Test Unit	LTCT1452
2-87	Drift	LTCT1643 replaces LTCT385
7-111	Drift	LTCT1644 replaces LTCT90
2-88	Mechanical Puller	LTCT2013 replaces LTCT186
2-89	Wrench Assembly	LTCT2019 replaces LTCT182
7-88	First Stage Turbine Flange - Finishing Kit	LTCT2020
2-90	Mechanical Puller	LTCT2021
2-91	Propeller Plug Puller Assembly	LTCT2022 replaces LTCT177 replaced by LTCT4510
6-16	Puller	LTCT2023 replaces LTCT73 replaced by LTCT4800
2-92	Gearshaft Holder	LTCT2037 replaces LTCT277

Table 2-1. Special Tools and Test Equipment (Cont)

FIGURE	NOMENCLATURE	PART NUMBER
2-93	Holder Assembly	LTCT2039 replaced by LTCT3833
2-94	Holding Device	LTCT2044 replaces LTCT278
2-95	Fuel Harness Wrench	LTCT2051 replaces LTCT219 replaced by LTCT4810
2-96	Puller	LTCT2067
2-97	Staking Punch	LTCT2069
2-98	Seal Holder	LTCT2070
2-99	(Deleted)	
2-99A	Holding Fixture	LTCT2075
3-17	Combustor Hoisting Adapter	LTCT2089 replaced by LTCT3665
2-100	Staking Tool	LTCT2094
2-101	Gear Holding Ring Assembly	LTCT2097 replaced by LTCT4016 and LTCT4018
2-102	Backlash Gage	LTCT2099
2-103	Puller	LTCT2121
7-88	First Stage Turbine Nozzle Flange Finishing Machine	LTCT2125 detail of LTCT2020
2-104	Wrench	LTCT2127 replaces LTCT260 replaced by LTCT4797
2-105	Wrench	LTCT2161 replaces LTCT213
2-29	Union	LTCT2169 detail of LTCT216
2-29	Handle	LTCT2170 detail of LTCT216
7-107	Nut	LTCT2266 detail of LTCT2125
2-49	Pase	LTCT2637 detail of LTCT482
2-49	Washer	LTCT2638 detail of LTCT482
2-49	Stud	LTCT2639 detail of LTCT482

Table 2-1. Special Tools and Test Equipment (Cont)

FIGURE	NOMENCLATURE	PART NUMBER
2-49	Handle	LTCT2667 detail of LTCT482
2-139	Hub and Adapter	LTCT3076 detail of LTCT4676
2-106	Backlash Gage	LTCT3486
2-107	Sleeve Bushing	LTCT3636
2-108	Sleeve Bushing	LTCT3640 replaces LTCT68-10
2-109	Arbor Press and Seal Removal Tool	LTCT3648 replaces LTCT101
2-110	Sleeve Bushing	LTCT3654
3-17	Combustor Hoisting Adapter	LTCT3665 replaces LTCT2089, LTCT53 and LTCT91
2-111	Adapter and Guide	LTCT3685
2-112	Pressure-Test Fixture	LTCT3694 replaces LTCT4145
2-113	(Deleted)	
2-114	Installation Tool	LTCT3825
2-114	Base	LTCT3826 detail of LTCT3825
2-114	Anvil	LTCT3827 detail of LTCT3825
2-115	Holder Assembly	LTCT3833 replaces LTCT2039
2-114	Clamp	LTCT3875 detail of LTCT3825
2-115A	Modification Kit	LTCT3941
2-116	Bracket	LTCT3955 replaces LTCT910
2-117	Cone Installation Tool	LTCT4013 replaces LTCT510
2-118	Gear Holding Ring Assembly	LTCT4016 replaces LTCT645 and LTCT2097

Table 2-1. Special Tools and Test Equipment (Cont)

FIGURE	NOMENCLATURE	PART NUMBER
2-119	Gear Holding Fixture	LTCT4018 replaces LTCT645 and LTCT2097
2-120	Spacer Mechanical Puller	LTCT4045 replaced by LTCT4842
2-121	Slide Hammer Assembly	LTCT4069 replaces LTCT674
2-122	Adapter Wrench	LTCT4081
8-37	Fixture Assembly	LTCT4100 replaces LTCT411
7-107	Adapter	LTCT4127 detail of LTCT2125
2-123	Pressure-Test Fixture	LTCT4145 replaced by LTCT3694
2-124	Ring Compressor	LTCT4155
7-107	Adapter	LTCT4162 detail of LTCT4172
7-107	Spacer	LTCT4165 detail of LTCT4172
7-106	Finishing Adapter Kit	LTCT4172
2-125	Alignment Fixture	LTCT4174
2-126	Installing Tool	LTCT4179
2-127	Socket Wrench	LTCT4181
2-128	Ultrasonic Flaw Detector Test Set	LTCT4188
2-47	(Deleted)	
2-47	(Deleted)	
2-48	Adapter Bushing	LTCT4310 detail of LTCT481
2-48	Adapter	LTCT4311 detail of LTCT481
2-48	Adapter	LTCT4312 detail of LTCT481
7-107	Bushing	LTCT4379 detail of LTCT2125

Table 2-1. Special Tools and Test Equipment (Cont)

FIGURE	NOMENCLATURE	PART NUMBER
2-49	Removal Disc	LTCT4334 detail of LTCT482
7-98	Finishing Machine Weight	LTCT4388 detail of LTCT2125
7-98	Finishing Machine Balance Shaft	LTCT4389 detail of LTCT2125
7-88	Spanner Wrench	LTCT4402-01 detail of LTCT2020
7-96	Spanner Wrench	LTCT4402-02 detail of LTCT2020
7-88	Shouldered Shaft	LTCT4405 detail of LTCT2020
7-88	Sleeve Bushing	LTCT4406 detail of LTCT2020
7-91	Protective Cover	LTCT4408 detail of LTCT2020
7-88	Face Spanner Wrench	LTCT4450 detail of LTCT2020
2-129	Socket Adapter	LTCT4457
2-130	Drift	LTCT4475
8-40	Oil Nozzle Test Fixture	LTCT4495 replaces LTCT901
7-93	Shaft Adapter	LTCT4496 detail of LTCT4495
2-131	Propeller Plug Puller Assembly	LTCT4510 replaces LTCT2022
2-132	Holding Fixture	LTCT4533 replaces LTCT576
2-133	Holding Fixture	LTCT4553
2-134	Forward Seal Puller	LTCT4568
2-135	Arbor	LTCT4571
2-136	Guide	LTCT4602
2-137	Hand Crank	LTCT4650
2-138	Holding Fixture	LTCT4675 replaces LTCT860

Table 2-1. Special Tools and Test Equipment (Cont)

FIGURE	NOMENCLATURE	PART NUMBER
2-139	Nut Removal Kit	LTCT4676 replaces LTCT576
2-139	Removal Tool	LTCT4677 detail LTCT4676 replac LTCT786
2-140	Mechanical Puller	LTCT4680 replaces LTCT919
2-141	Locating Pin Removal Tool	LTCT4692
2-142	Ring Compressor	LTCT4718 replaced by RG40C
2-143	Wrench	LTCT4797 replaces LTCT2127
2-144	Puller	LTCT4800 replaces LTCT2023
3-29	Mechanical Puller	LTCT4809
2-144A	Fuel Harness Wrench	LTCT4810 replaces LTCT2051
2-49	Spacer	LTCT4833 detail LTCT482
2-145	Spacer Mechanical Puller	LTCT4812 replaces LTCT4045
2-146	Puller	LTCT4846
3-42	Pin Removal Tool	LTCT4895 replaces LTCT488 and LTCT504
2-147	Holding Fixture	LTCT4904 replaces LTCT44
2-148	Removing and Installing Tool	LTCT4947
2-149	Installation Tool	LTCT6000
3-27	Measuring Tool	LTCT6124
2-150	Stop Assembly	LTCT6241
2-150-1	Bore Heater	LTCT6354

Table 2-1. Special Tools and Test Equipment (Cont)

FIGURE	NOMENCLATURE	PART NUMBER
2-150A	Cone Removal Tool	LTCT6465
2-151	Spanner Wrench	LTCT6605
2-152	Puller	LTCT6723
2-151-1	Adapter	LTCT6740
2-151-2	Adapter	LTCT6756
2-151A	Stop Assembly	LTCT6763
2-153	Wrench	LTCT6940
3-34	Holding Fixture	LTCT6985
2-48	Thrust Washer	LTCT9023-10 detail of LTCT481
2-49	Flat Washer	LTCT9023-13 detail of LTCT482
7-88	Delay Relay and Cable Assembly	LTCT9260 detail of LTCT2020
7-88	Cutter	LTCT9261 detail of LTCT2020
7-88	Cartridge Fuse	LTCT9262 detail of LTCT2020
7-88	Spanner Wrench	LTCT9263 detail of LTCT2020
7-88	Electrical Contact Bushing	LTCT9264 detail of LTCT2020
7-88	Air Filter Element	LTCT9266 detail of LTCT2020
8-12	Adapter	LTCT9268 detail of LTCT315
8-12	Lead	LTCT9271 detail of LTCT315
8-12	Test Lead	LTCT9272 detail of LTCT315
8-12	Lead	LTCT9277 detail of LTCT315
2-48A, 10-1A	Vibration Spectrum Analyzer	LTCT9281 detail of LTCT484

Table 2-1. Special Tools and Test Equipment (Cont)

FIGURE	NOMENCLATURE	PART NUMBER
2-48A, 2-157A	Vibration Pickup	LTCT9282 detail of LTCT484 and LTCT20596
2-48A, 2-157A	Cable Assembly	LTCT9283-02 detail of LTCT484 and LTCT20596
7-91	Garter Extension Spring	LTCT9396 detail of LTCT2020
8-5	Test Fixture	LTCT10440
2-154	Test Lead	LTCT10462
2-155	Installing Tool	LTCT13070
2-155A	Installation Tool	LTCT13102
2-155B	Torque Fixture	LTCT13175 replaces LTCT576, LTCT4533, and LTCT4676
2-155C	Torque Fixture	LTCT13430 replaces LTCT508, LTCT860, and LTCT4533
2-155C	Wrench, Spanner	LTCT13435 detail of LTCT13430 replaces LTCT260, LTCT587, and LTCT4797
2-155B	Wrench, Socket	LTCT13456 detail of LTCT13175 replaces LTCT584
2-155D	Special Purpose Electrical Cable Assembly	LTCT13476
2-155E	Electric Torquemeter Comparator Test Set	LTCT13608
2-155F	Cone Removal Tool Adapter	LTCT13676

Table 2-1. Special Tools and Test Equipment (Cont)

FIGURE	NOMENCLATURE	PART NUMBER
2-156	Installer	LTCT13685
2-157	Torquemeter Removal Tool	LTCT13686
2-157-1	Clamp Gage, Topping Governor	LTCT14503
2-157-2	Bore Heater Control	LTCT14547
2-157A	Vibration Test Set, Battery Operated	LTCT20596
2-157A, 10-1B	Vibration Meter	LTCT22031-01, detail of LTCT20596
2-48	Screw	MS16182-103, detail of LTCT481
2-157B	Power Wrench	PD2501
2-158	Ring Compressor	RC40C replaces LTCT4718
5-57	Cleaning Fixture	SPT 107
5-38	Rigging Tool	STD62489
2-159	Sleeve Puller	STD63557
3-30	Power Wrench	SWE8100
3-30	Anchor Plate	SWE8473-1W
3-30	Socket	SWE8673L
2-160	(Deleted)	
2-161, 3-10	Adapter Arm	SWE13852-1210
3-10	Adapter Base	SWE13852-1510
3-10	Gearbox	SWE13870
2-163	Mobile Trailer Assembly	TE12062
2-164	(Deleted)	
8-10	Adapter	11-6532 detail of LTCT315
3-10	Stand	42M76
3-20	12-Inch Feeler Gage	172E
2-166	Tang Breakoff Tool	1196-9
2-165	(Deleted)	
2-166A	Tang Breakoff Tool	3581-8
2-167	Tap	38193-9

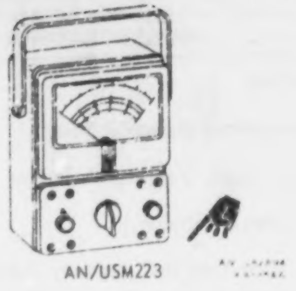
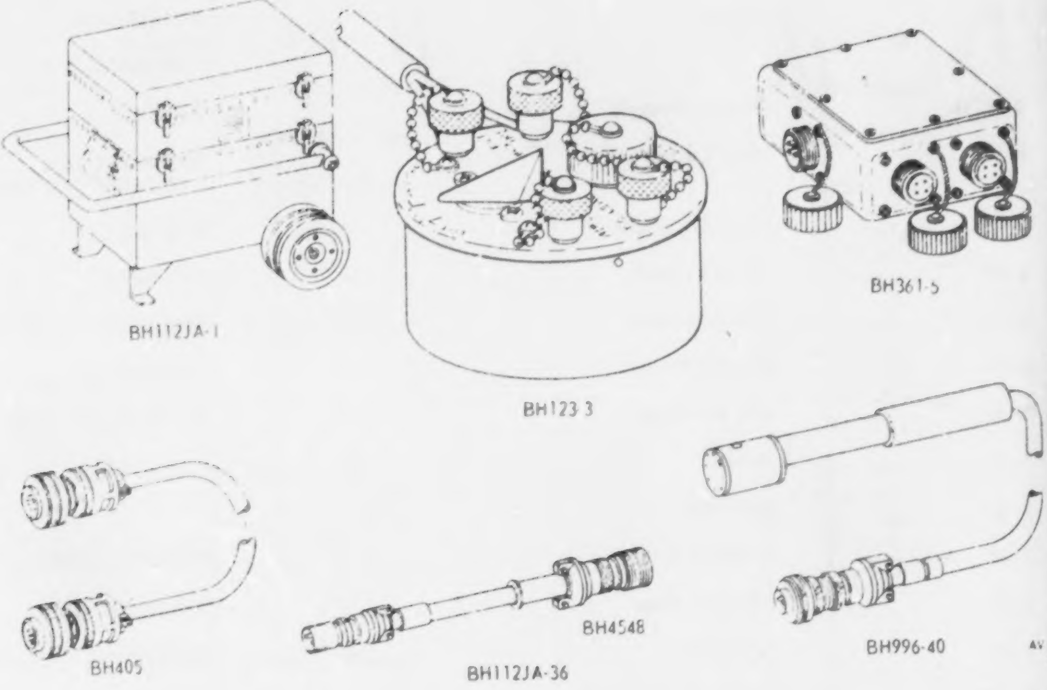


Figure 2-1. Multimeter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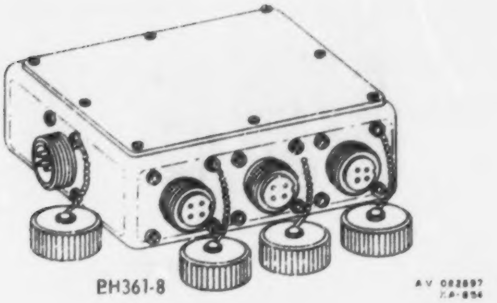
BH361-5
BH405
BH4548
BH112JA-36
BH996-40

Figure 2-2. Jetcal Analyzer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AV 082897

Figure 2-3. Junction Box

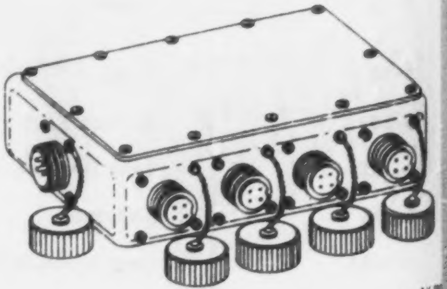
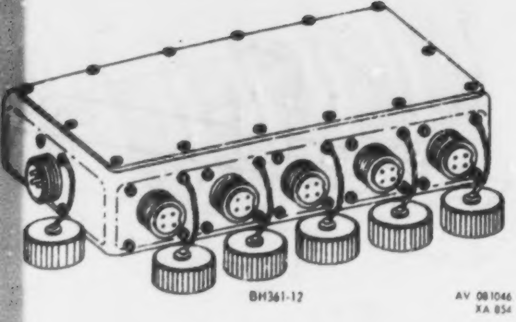


Figure 2-3A. Junction Box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AV 081046
XA 854

Figure 2-3B. Junction Box

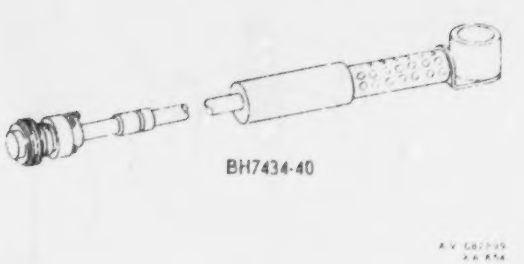


Figure 2-4. Probe Assembly

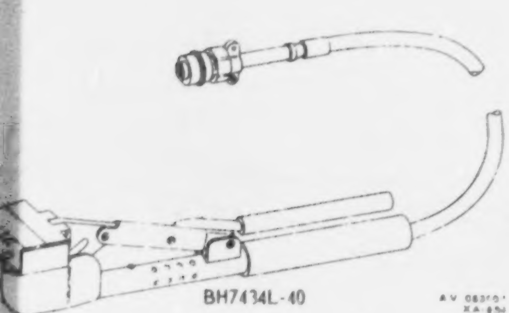


Figure 2-5. Probe Assembly

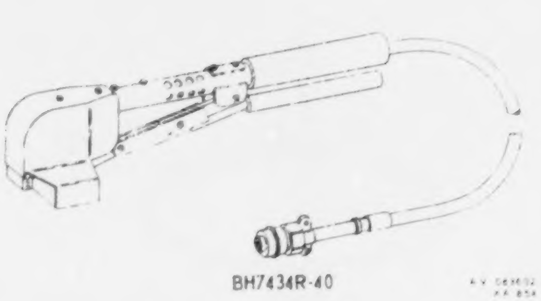
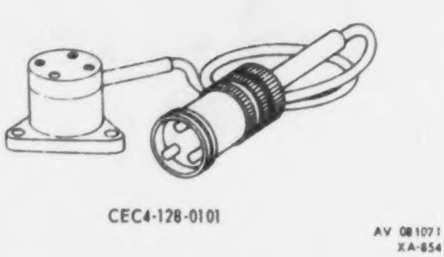


Figure 2-6. Probe Assembly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AV 081071
XA-854

Figure 2-6A. Vibration Pickup

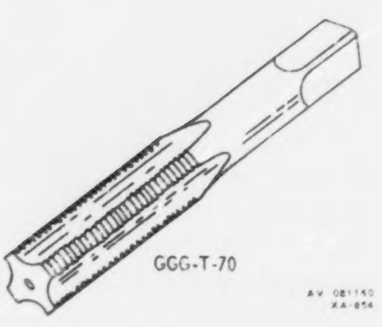


Figure 2-6B. Thread Tap

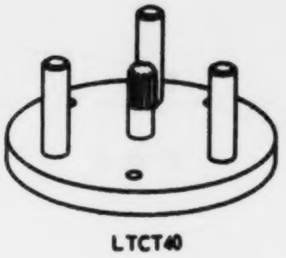


Figure 2-7. Holding Fixture

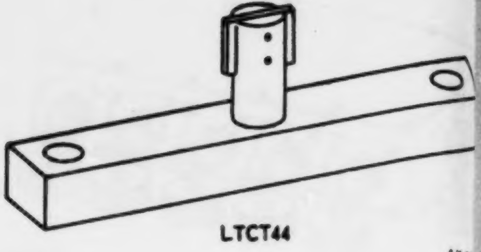


Figure 2-8. Holding Fixture

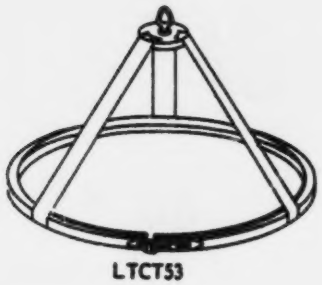


Figure 2-9. Lifting Adapter

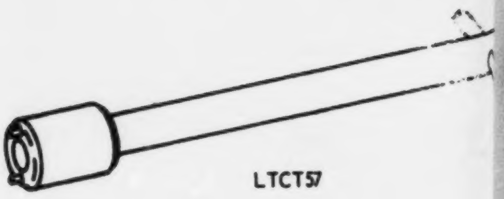
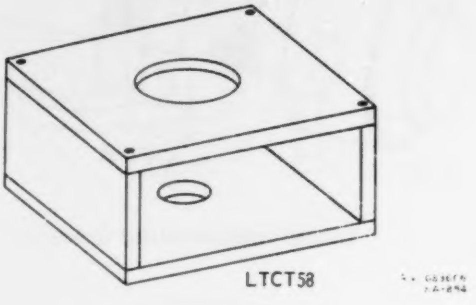


Figure 2-10. Wrench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XA-854

Figure 2-11. Holding Fixture

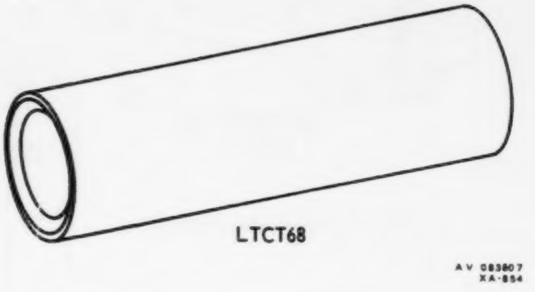
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Figure 2-12. Bushing

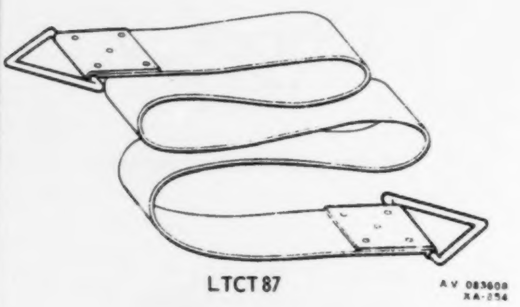
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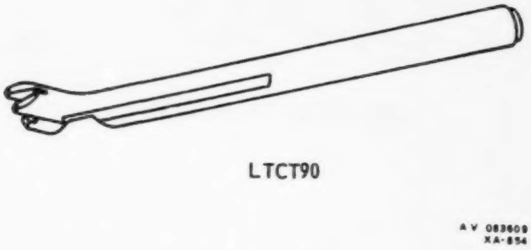
Figure 2-13. Sling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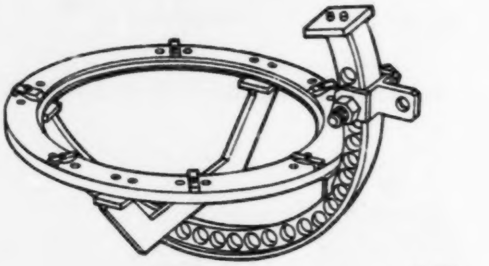
XA-854

Figure 2-14. Blade Removal Tool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XA-854

Figure 2-15. Lifting Fixture

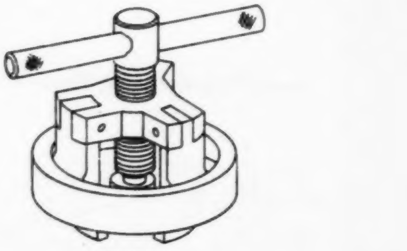
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Figure 2-16. Bearing Puller

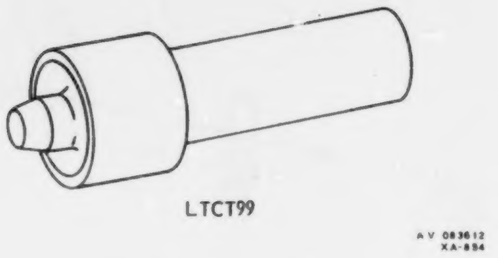
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Figure 2-17. Installing Tool

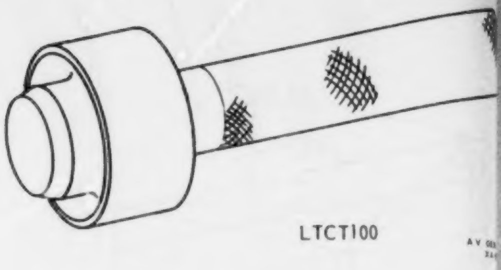

Figure 2-18. Installing Tool

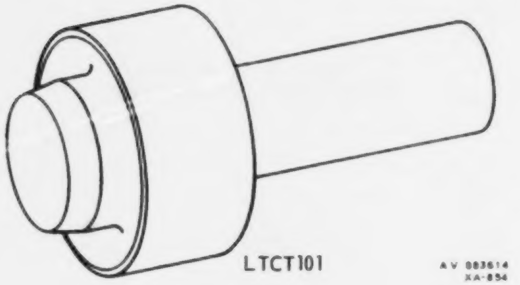
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Figure 2-19. Removal Tool

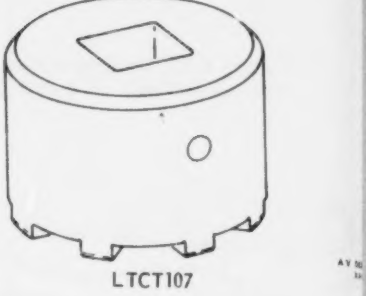

Figure 2-20. Spanner Wrench

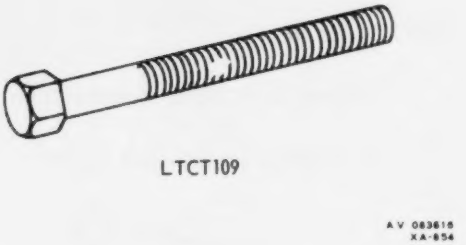
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Figure 2-21. Bolt

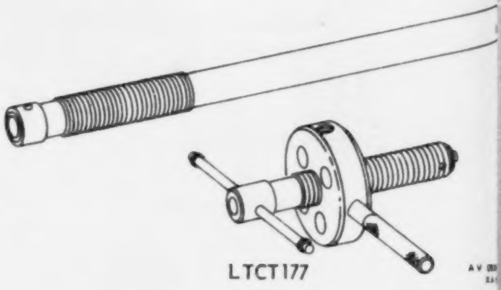

Figure 2-22. Propeller Plug Puller Assemb

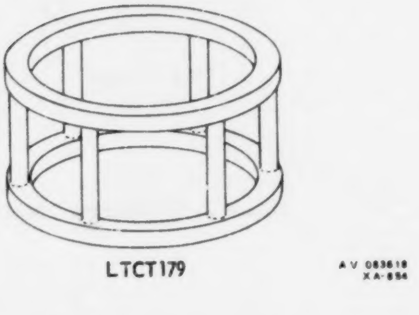
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Figure 2-23. Support Ring

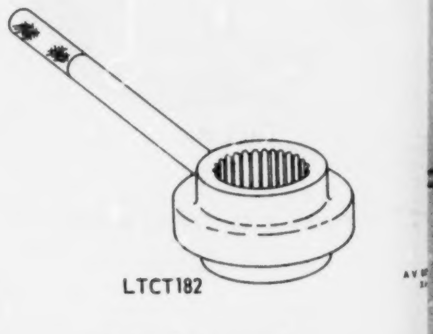

Figure 2-24. Handle

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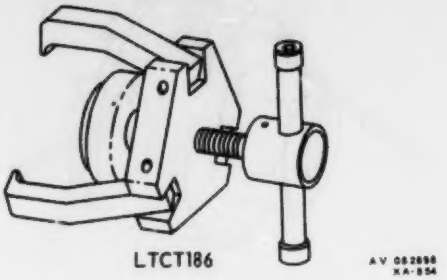
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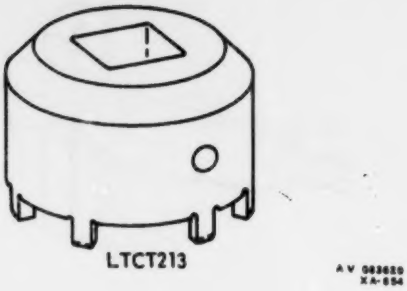
Figure 2-25. Mechanical Puller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XA-854

Figure 2-26. Wrench

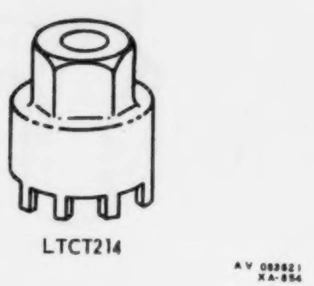
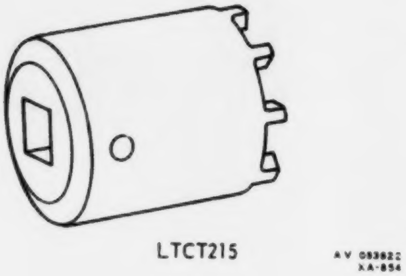

LTCT214
AV 083621
XA-854

Figure 2-27. Wrench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AV 083622
XA-854

Figure 2-28. Wrench

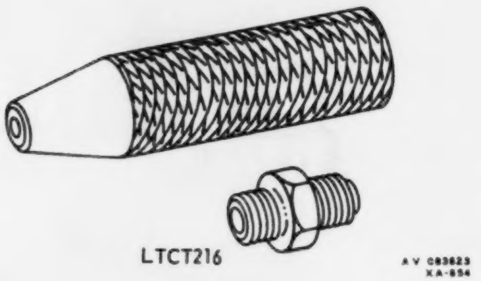
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Figure 2-29. Test Fixture

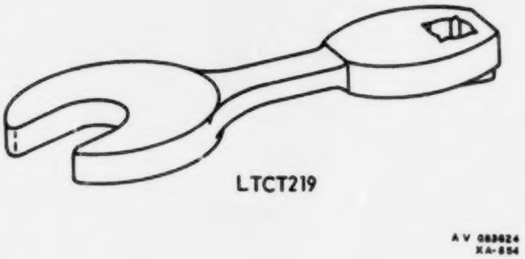
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Figure 2-30. Fuel Harness Wrench

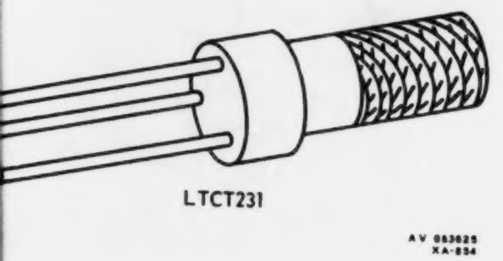
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Figure 2-31. Bearing Removal Tool

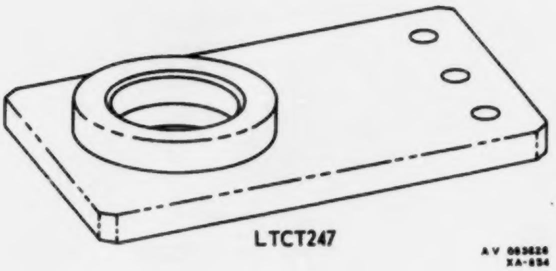
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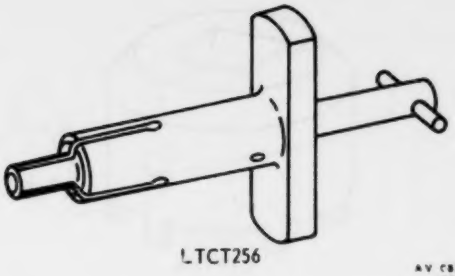
Figure 2-32. Holding Fixture



AV 083627
XA-854

Figure 2-33. Pin Installer

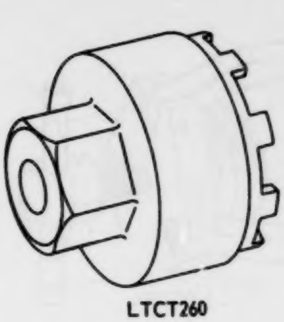
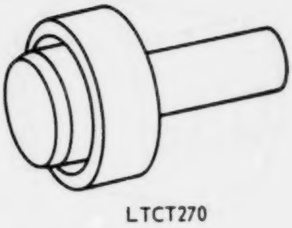


Figure 2-34. Wrench



AV 083628
XA-854

Figure 2-35. Installer

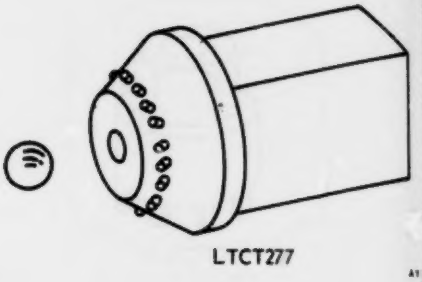
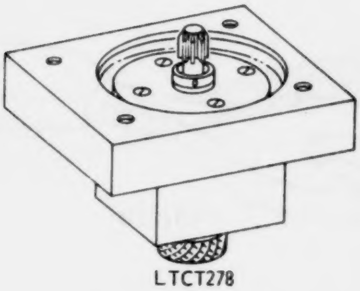


Figure 2-36. Gearshaft Holder



AV 083630
XA-854

Figure 2-37. Holding Device

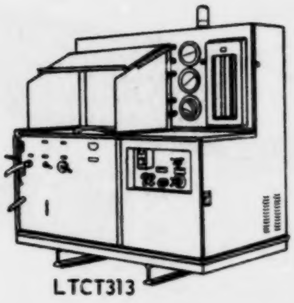
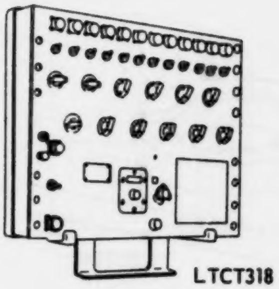


Figure 2-38. Oil Flow Check Stand



AV 083632
XA-854

Figure 2-39. Console Tester

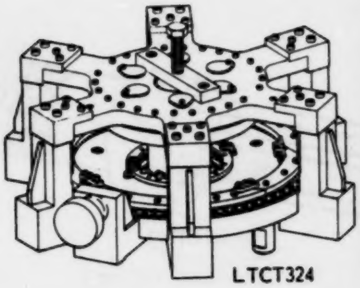


Figure 2-40. Fixture

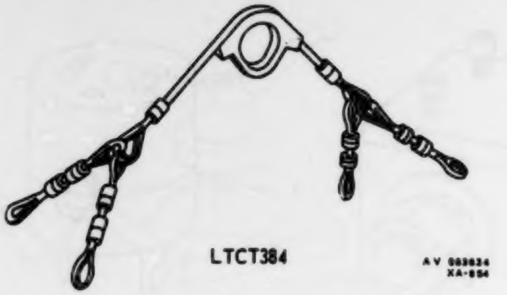

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Figure 2-41. Engine Sling

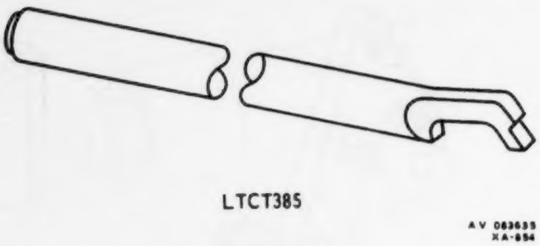
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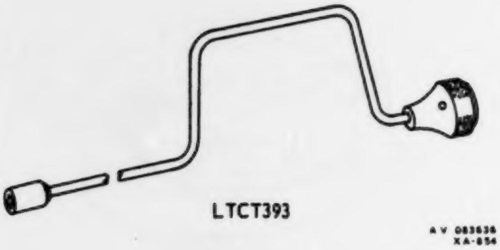
Figure 2-42. Wrench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XA-854

Figure 2-43. Wrench

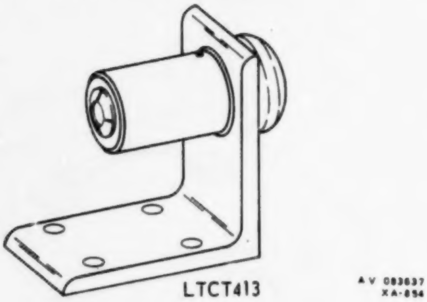
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Figure 2-44. Holding Fixture

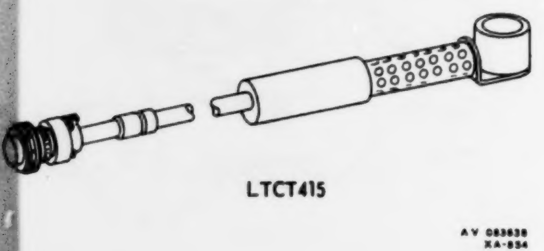
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Figure 2-45. Test Fixture

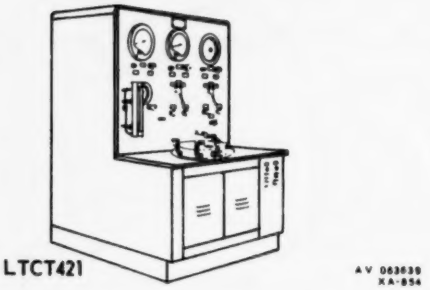
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Figure 2-46. Test Stand

Figure 2-47 deleted

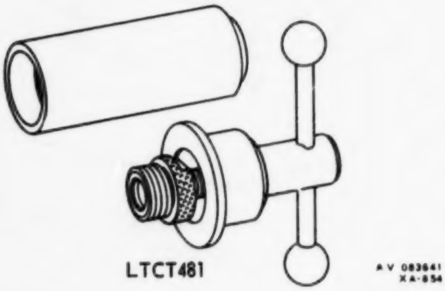
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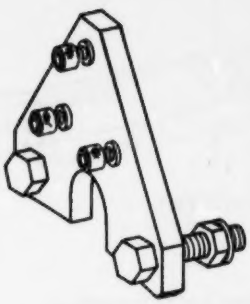
Figure 2-48. Installing Tool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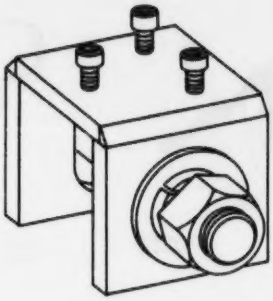
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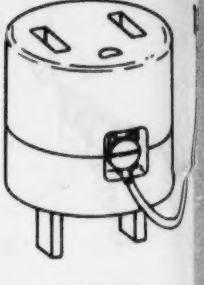
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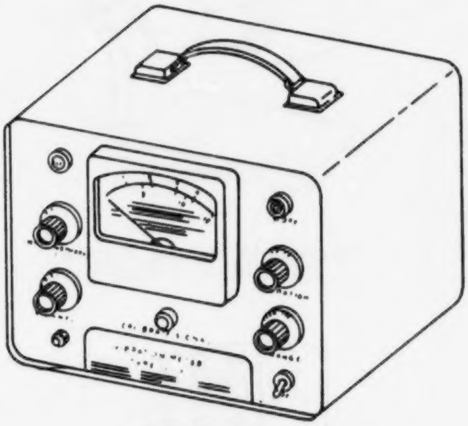
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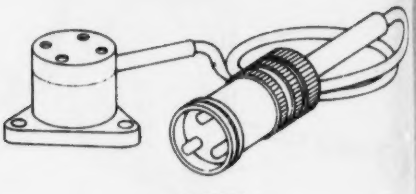
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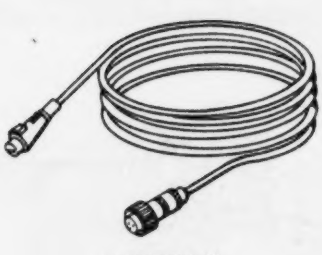
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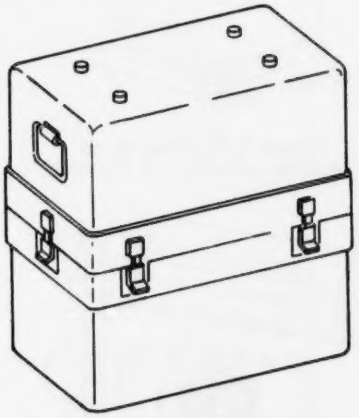
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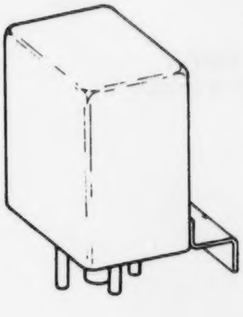
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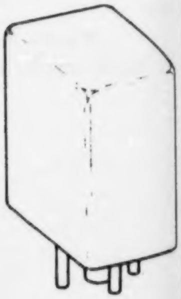
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LTCT484

Figure 2-48A. Vibration Check Tool Kit

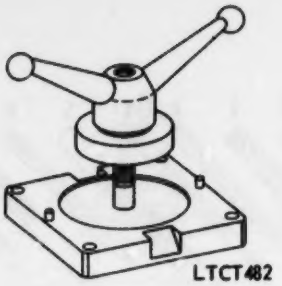
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Figure 2-49. Installing and Removing Tool

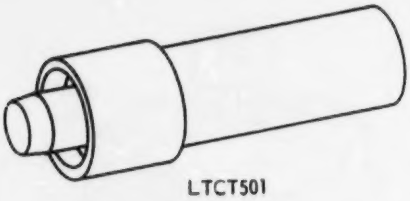
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Figure 2-50. Installing Tool

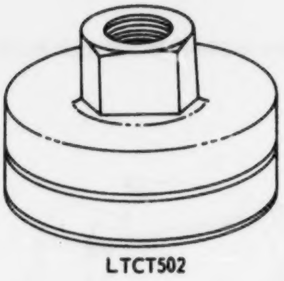
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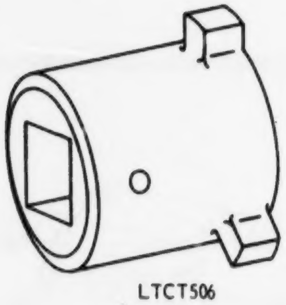
Figure 2-51. Cone Removal Socket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XA-854

Figure 2-52. Socket Wrench

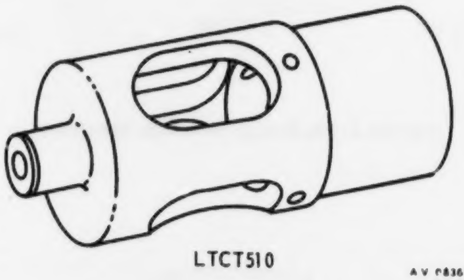
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Figure 2-53. Cone Installation Tool

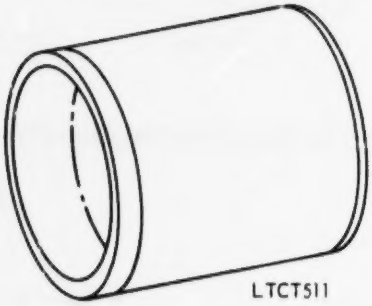
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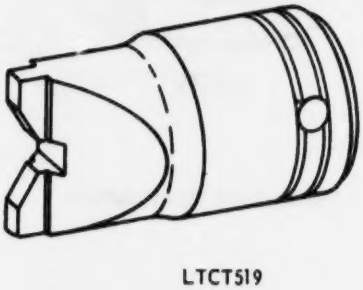
Figure 2-54. Installation Tool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XA-854

Figure 2-55. Installation and Removal Tool

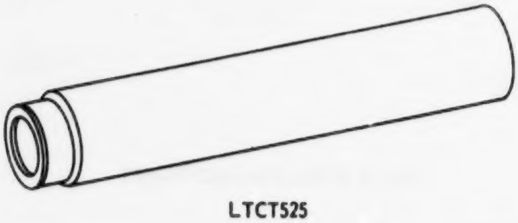
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Figure 2-56. Cup Installing Tool

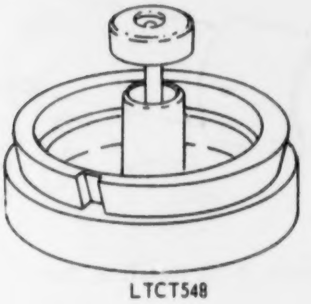

Figure 2-57. Removal Fixture

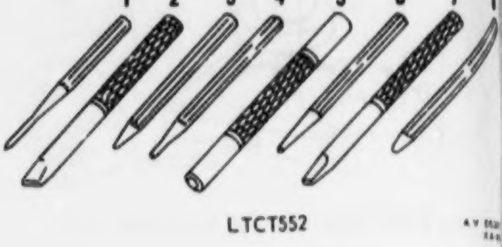
1
2
3
4
5
6
7
LTCT552

Figure 2-58. Hammer and Drift

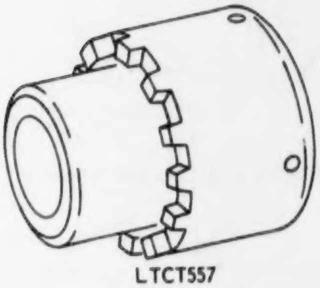

Figure 2-59. Socket and Pilot Assembly

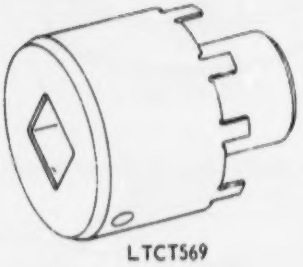

Figure 2-60. Socket Wrench Assembly

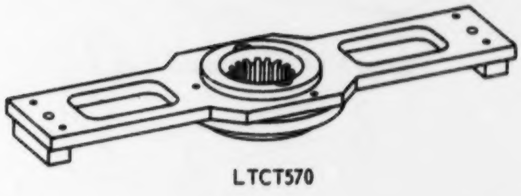

Figure 2-61. Holding Fixture

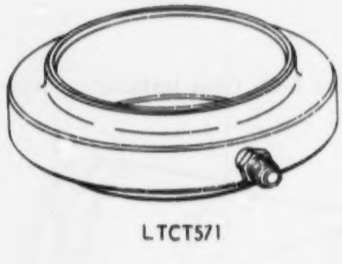

Figure 2-62. Test Fixture

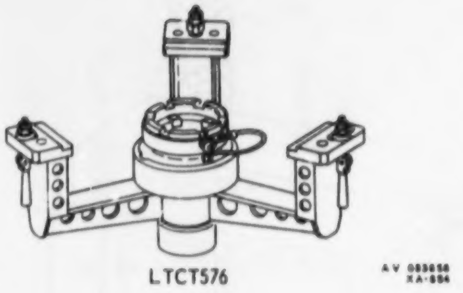
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Figure 2-63. Hub and Adapter Assembly

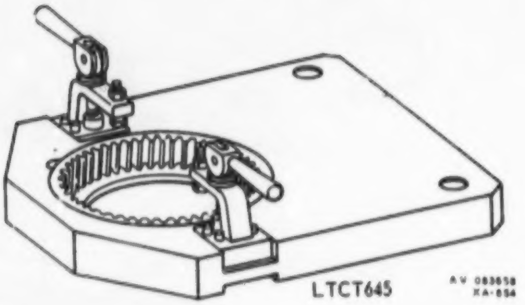
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Figure 2-64. Gear Holding Ring Assembly

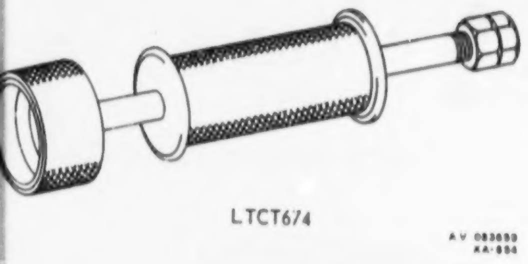
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Figure 2-65. Slide Hammer Assembly

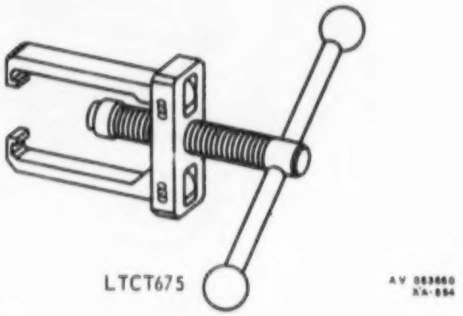
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Figure 2-66. Bearing Puller

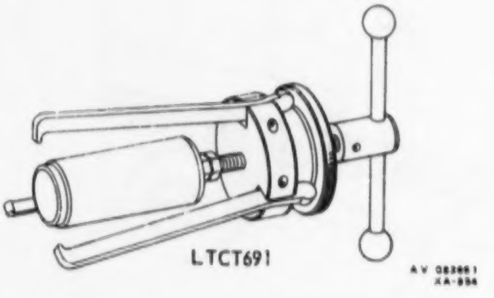
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Figure 2-67. Puller

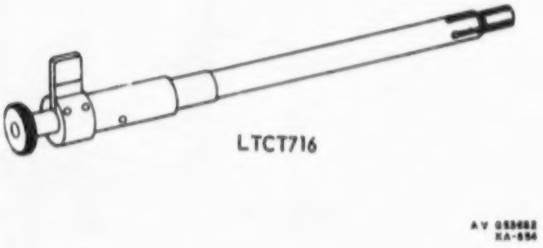
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Figure 2-68. Backlash Gage

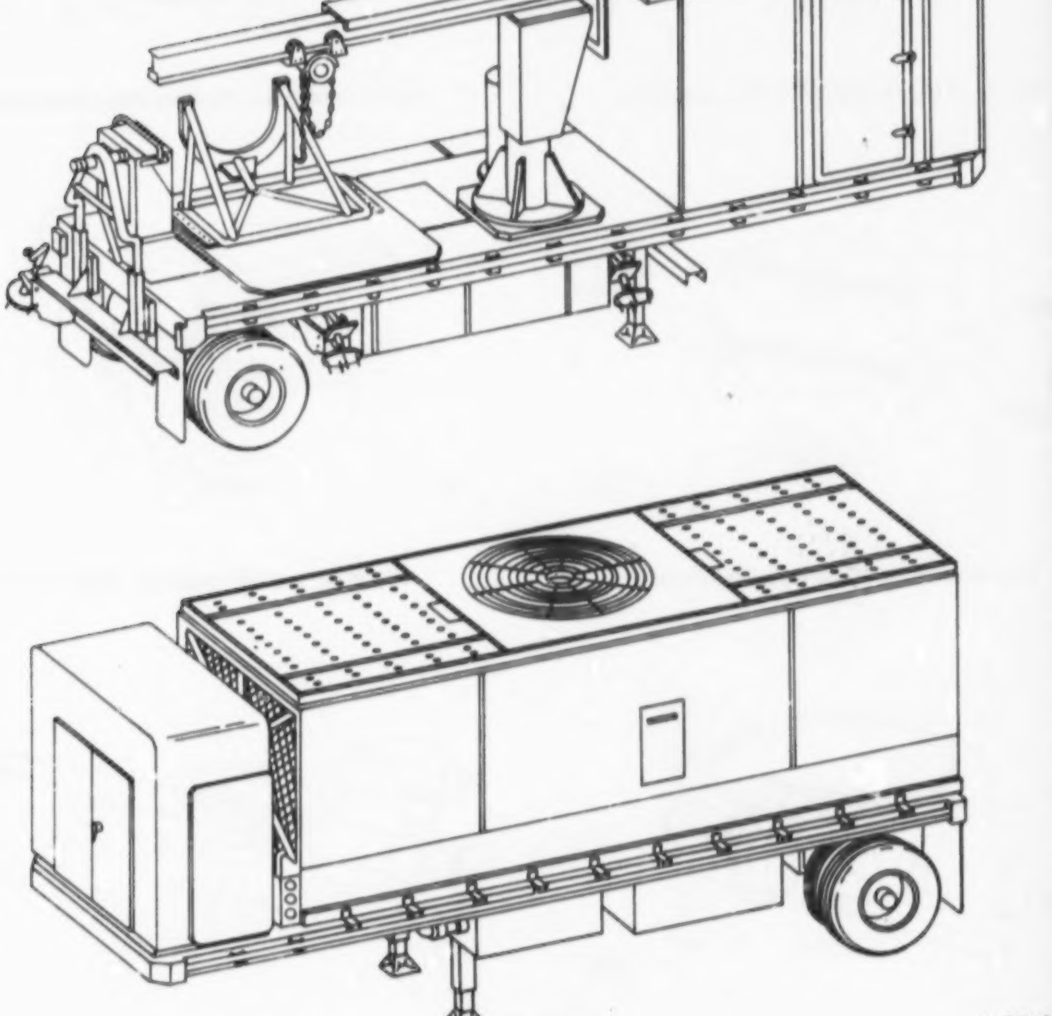
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Figure 2-69. Mobile Trailer Assembly

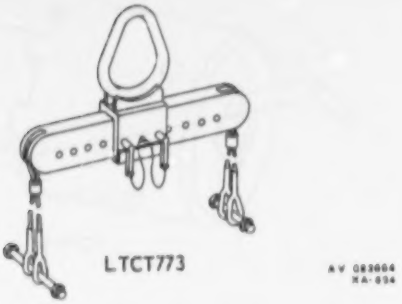
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Figure 2-70. Engine Sling

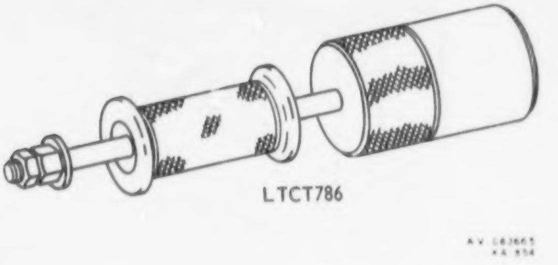
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Figure 2-71. Removal Tool

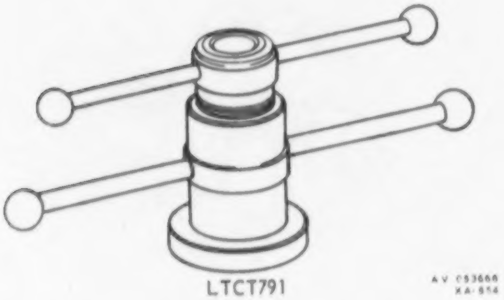
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Figure 2-72. Installing Tool

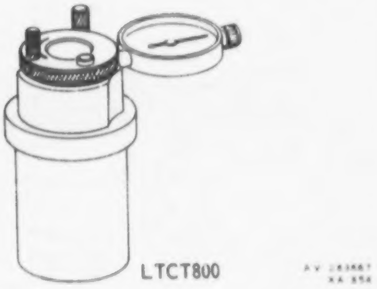
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Figure 2-73. Gage

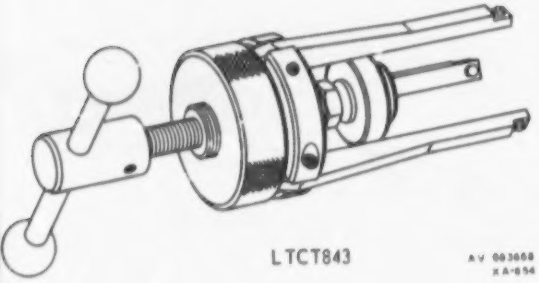
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Figure 2-74. Puller

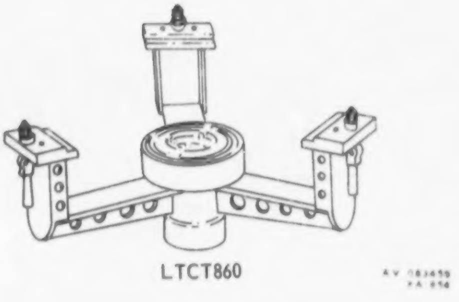
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Figure 2-75. Holding Fixture

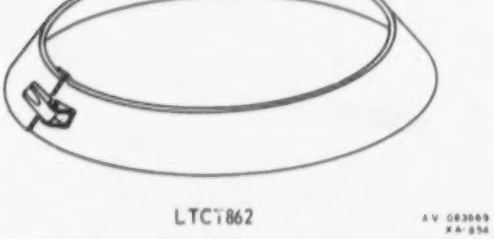
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Figure 2-76. Engine Intake Protector

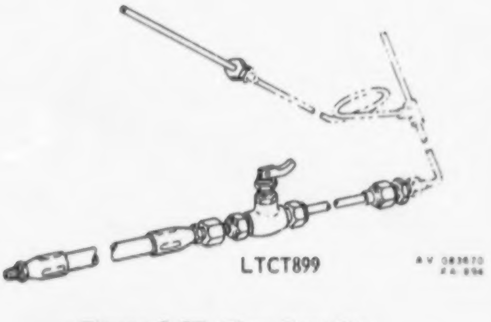
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Figure 2-77. Flow Test Rig

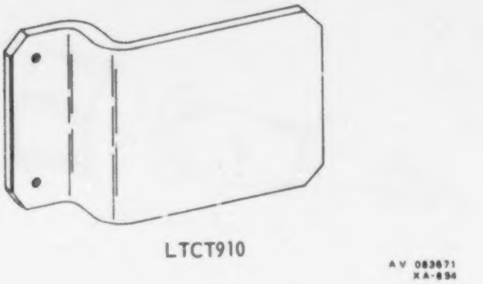
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Figure 2-78. Angle Bracket

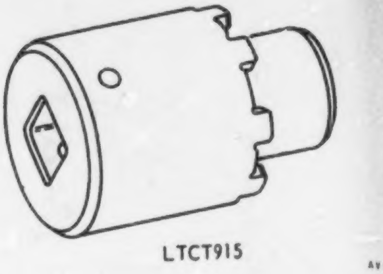

Figure 2-79. Wrench

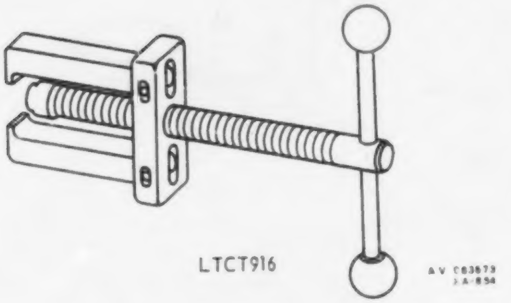
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Figure 2-80. Bearing Puller

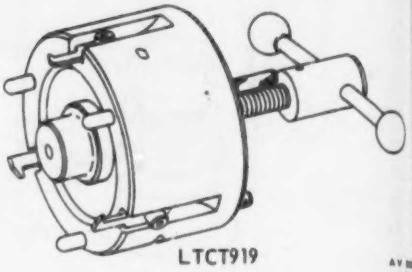
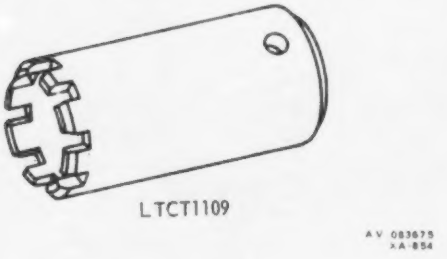


Figure 2-81. Mechanical Puller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XA-854

Figure 2-82. Wrench

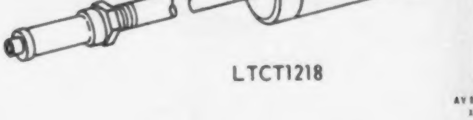

Figure 2-83. Mechanical Puller

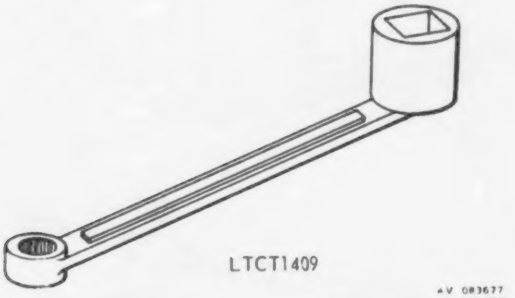
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Figure 2-84. Wrench

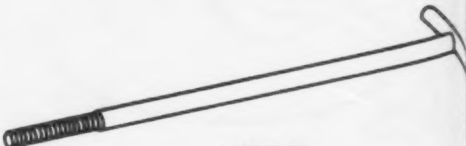

Figure 2-85. Bolt

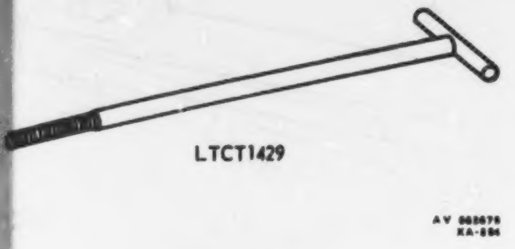

Figure 2-86. Bolt

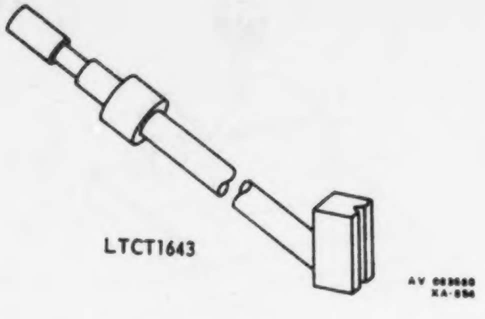

Figure 2-87. Drift

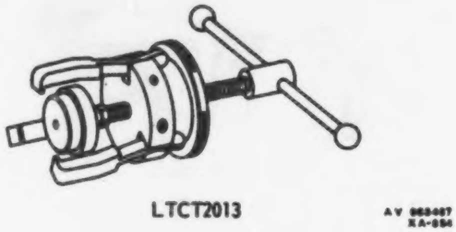

Figure 2-88. Mechanical Puller

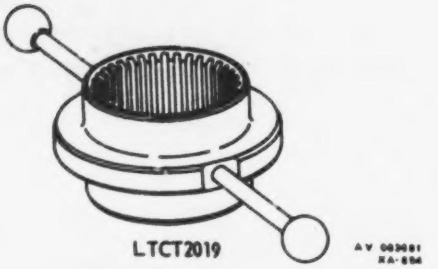

Figure 2-89. Wrench Assembly

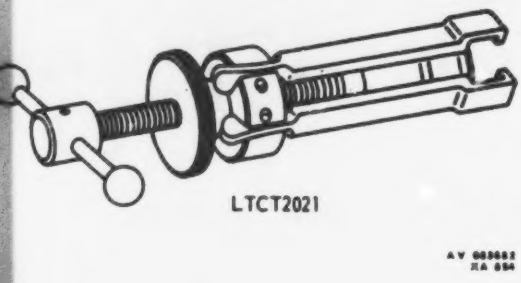

Figure 2-90. Mechanical Puller

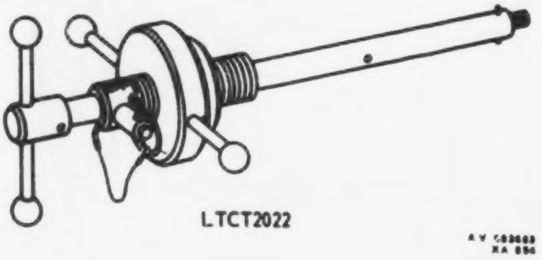

Figure 2-91. Propeller Plug Puller Assembly

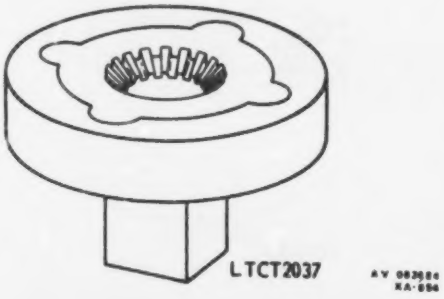

Figure 2-92. Gearshaft Holder

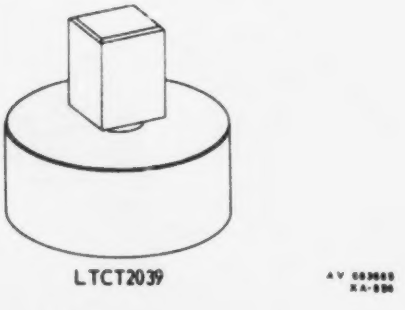

Figure 2-93. Holder Assembly

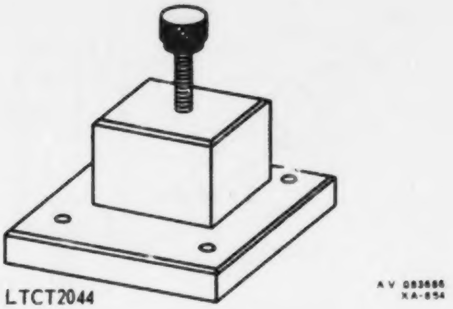
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Figure 2-94. Holding Device

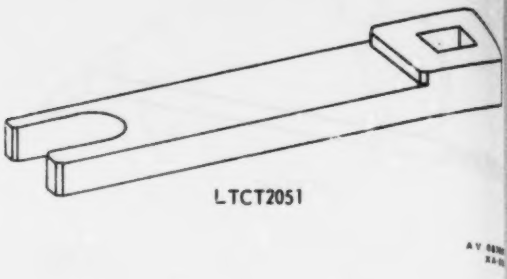

Figure 2-95. Fuel Harness Wrench

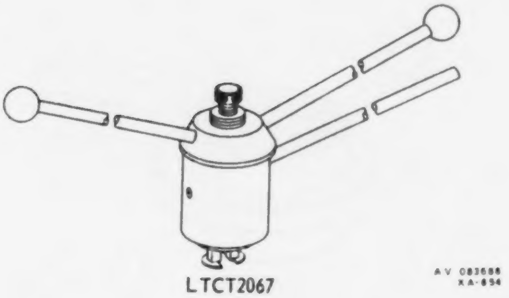
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Figure 2-96. Puller

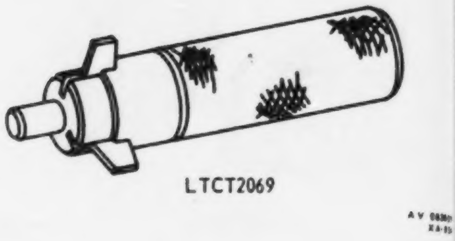

Figure 2-97. Staking Punch

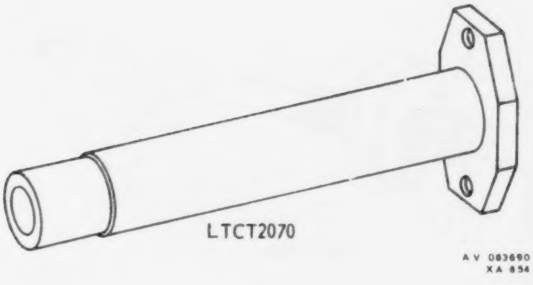
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Figure 2-98. Seal Holder

Figure 2-99 deleted

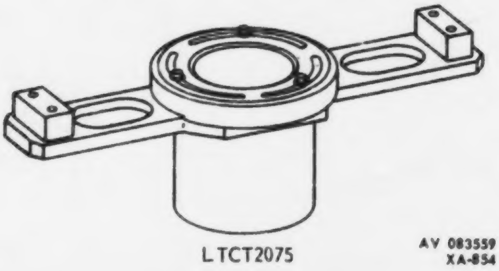
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Figure 2-99A. Sun Gear Holding Fixture

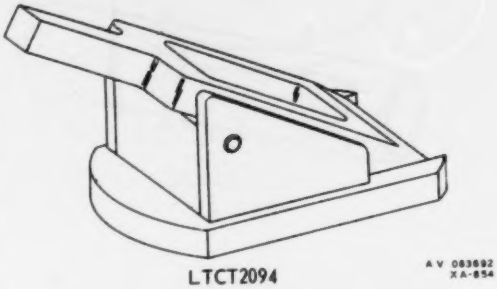
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Figure 2-100. Staking Tool

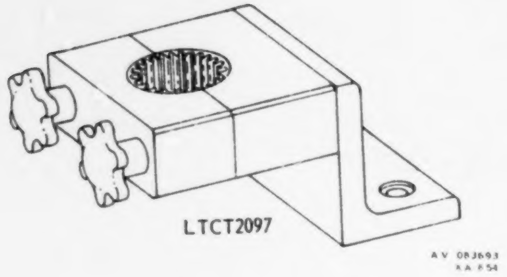
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Figure 2-101. Gear Holding Ring Assembly

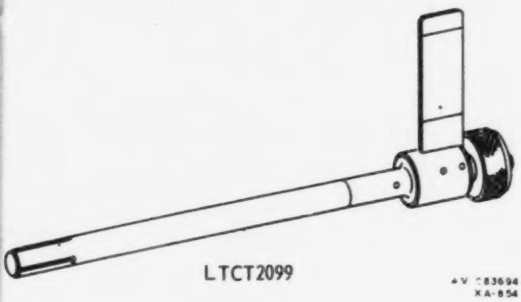
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Figure 2-102. Backlash Gage

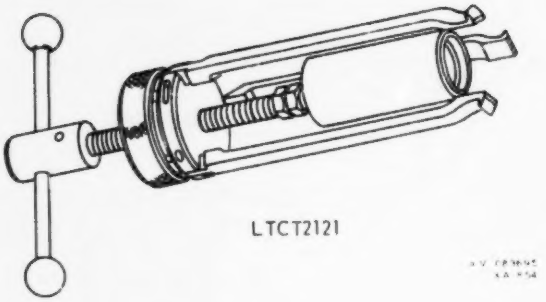

Figure 2-103. Puller

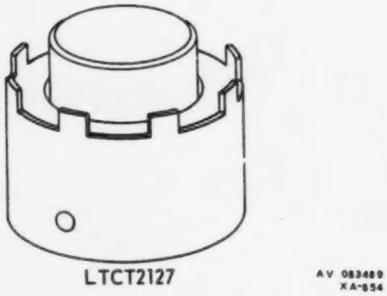
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Figure 2-104. Wrench

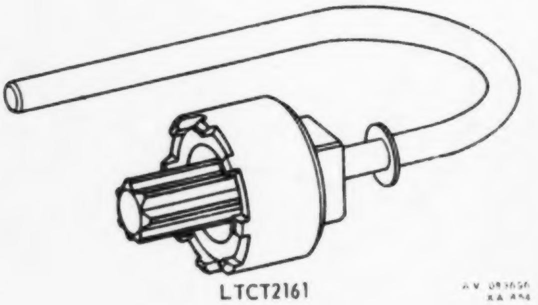

Figure 2-105. Wrench

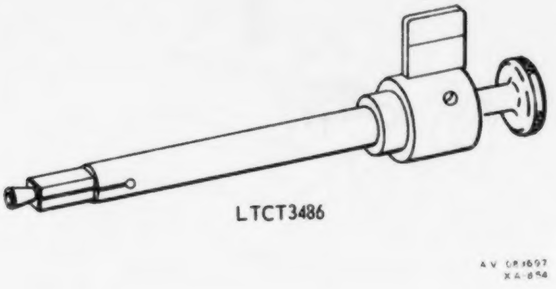
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Figure 2-106. Backlash Gage

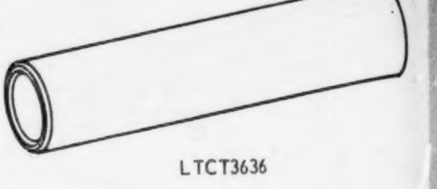

Figure 2-107. Sleeve Bushing

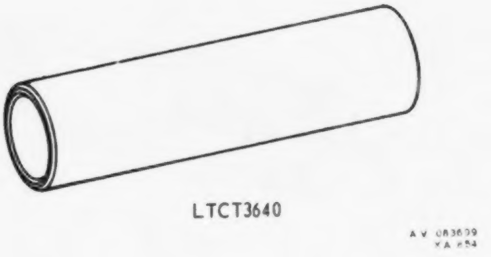
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Figure 2-108. Sleeve Bushing

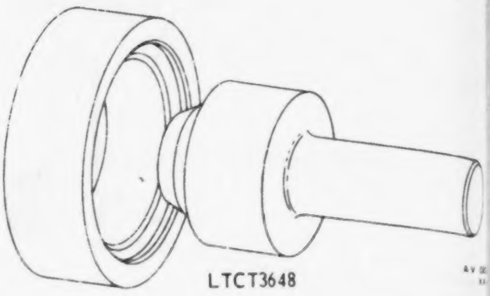

Figure 2-109. Arbor Press and Seal Removal

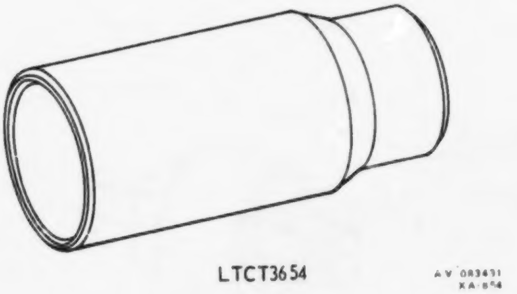
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Figure 2-110. Sleeve Bushing

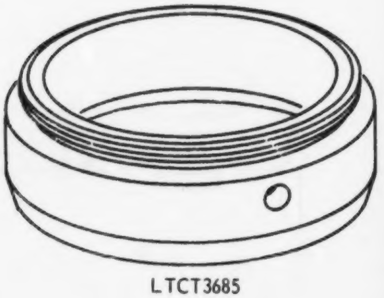

Figure 2-111. Adapter and Guide

Pages 2-34A and 2-34B deleted.

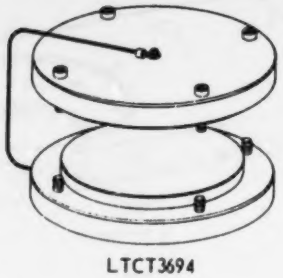

Figure 2-112. Pressure Test Fixture

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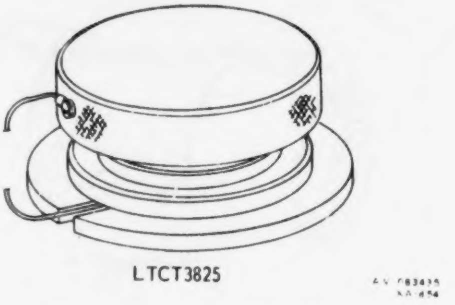
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Figure 2-114. Installation Tool

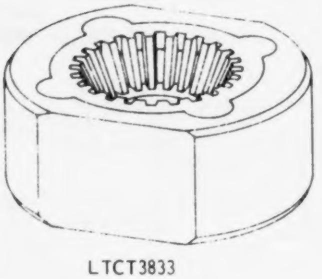

Figure 2-115. Holder Assembly

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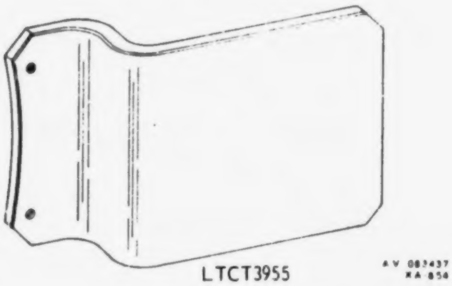
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Figure 2-116. Bracket

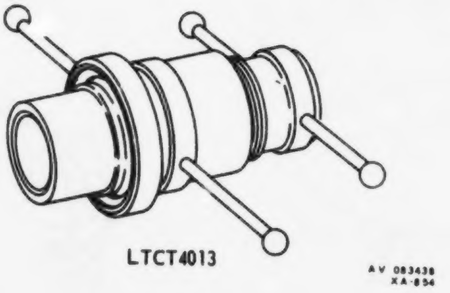
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Figure 2-117. Cone Installation Tool

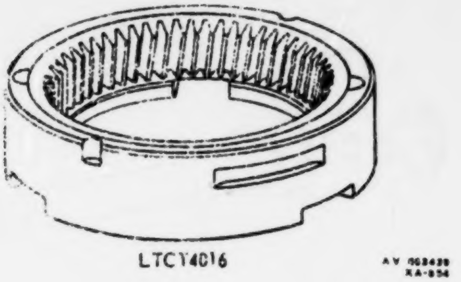


Figure 2-118. Gear Holding Ring Assembly

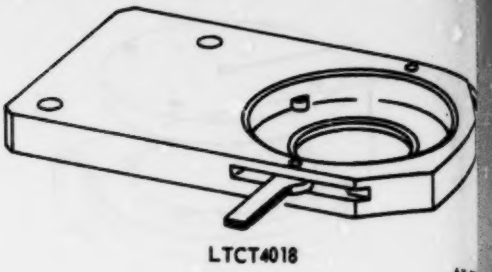


Figure 2-119. Gear Holding Fixture

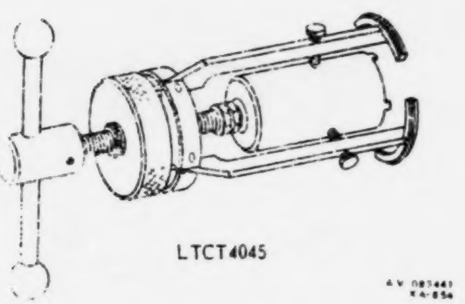


Figure 2-120. Spacer Mechanical Puller

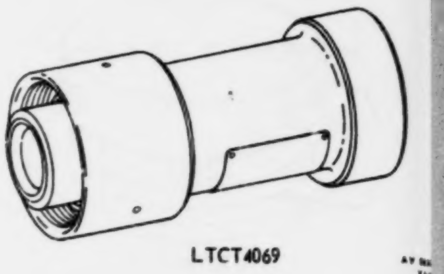


Figure 2-121. Slide Hammer Assembly

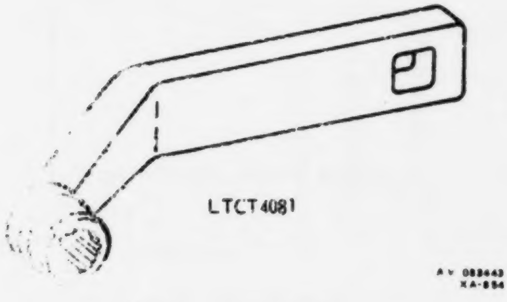


Figure 2-122. Adapter Wrench

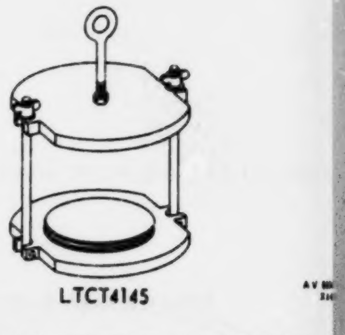


Figure 2-123. Pressure - Test Fixture

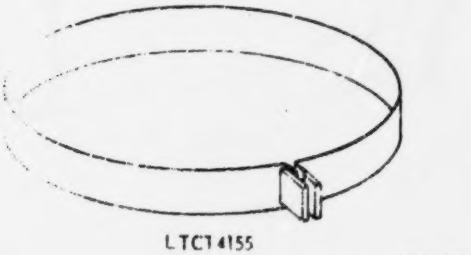


Figure 2-124. Ring Compressor

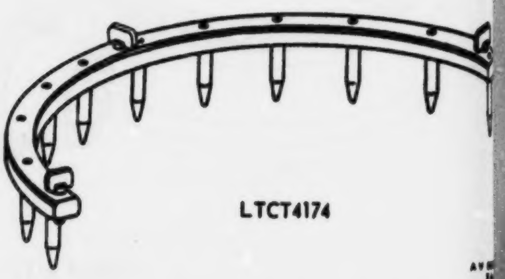
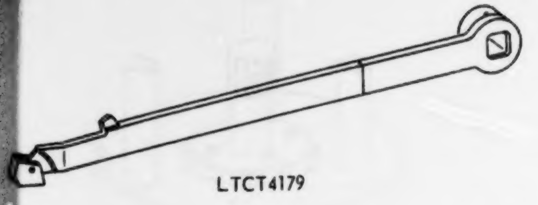


Figure 2-125. Alignment Fixture



AV 083447
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Figure 2-126. Installing Tool

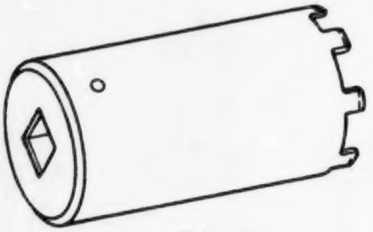

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Figure 2-127. Socket Wrench

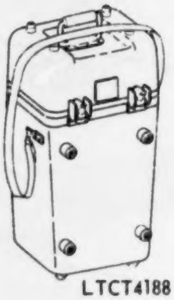

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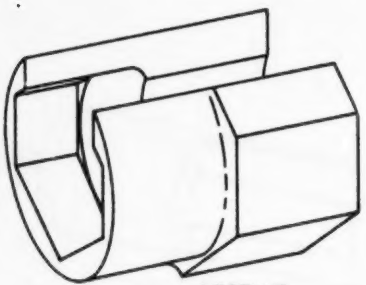
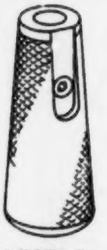
Figure 2-128. Ultrasonic Flaw Detector Test Set



AV 083450
XA-854

Figure 2-129. Socket Adapter



AV 083451
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Figure 2-130. Drift

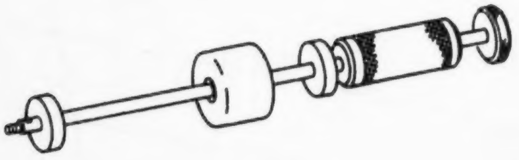

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Figure 2-131. Propeller Plug Puller Assembly

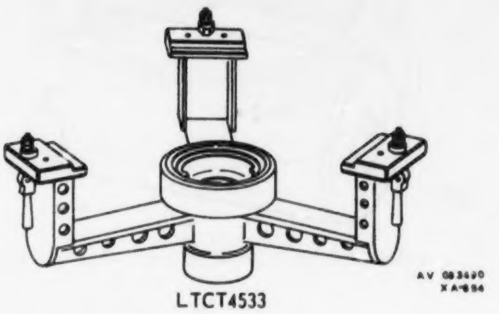
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Figure 2-132. Holding Fixture

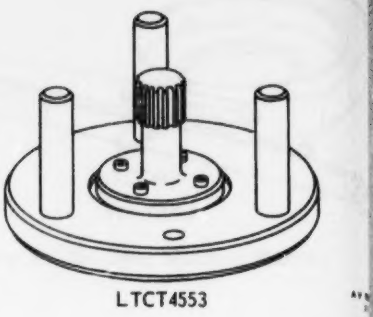

Figure 2-133. Holding Fixture

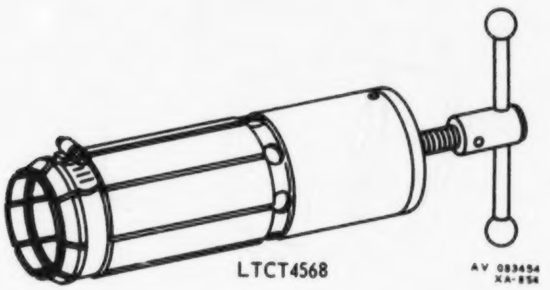
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Figure 2-134. Forward Seal Puller

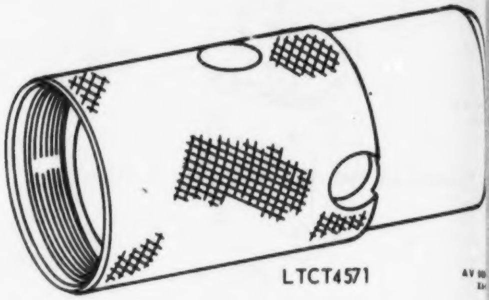

Figure 2-135. Arbor

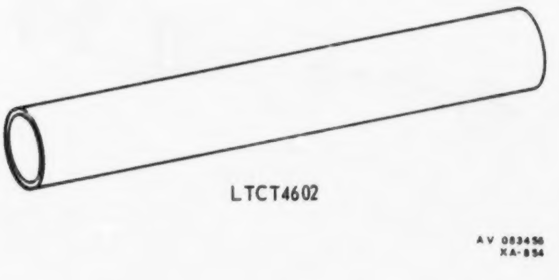
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Figure 2-136. Guide

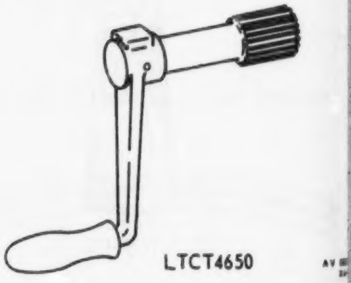
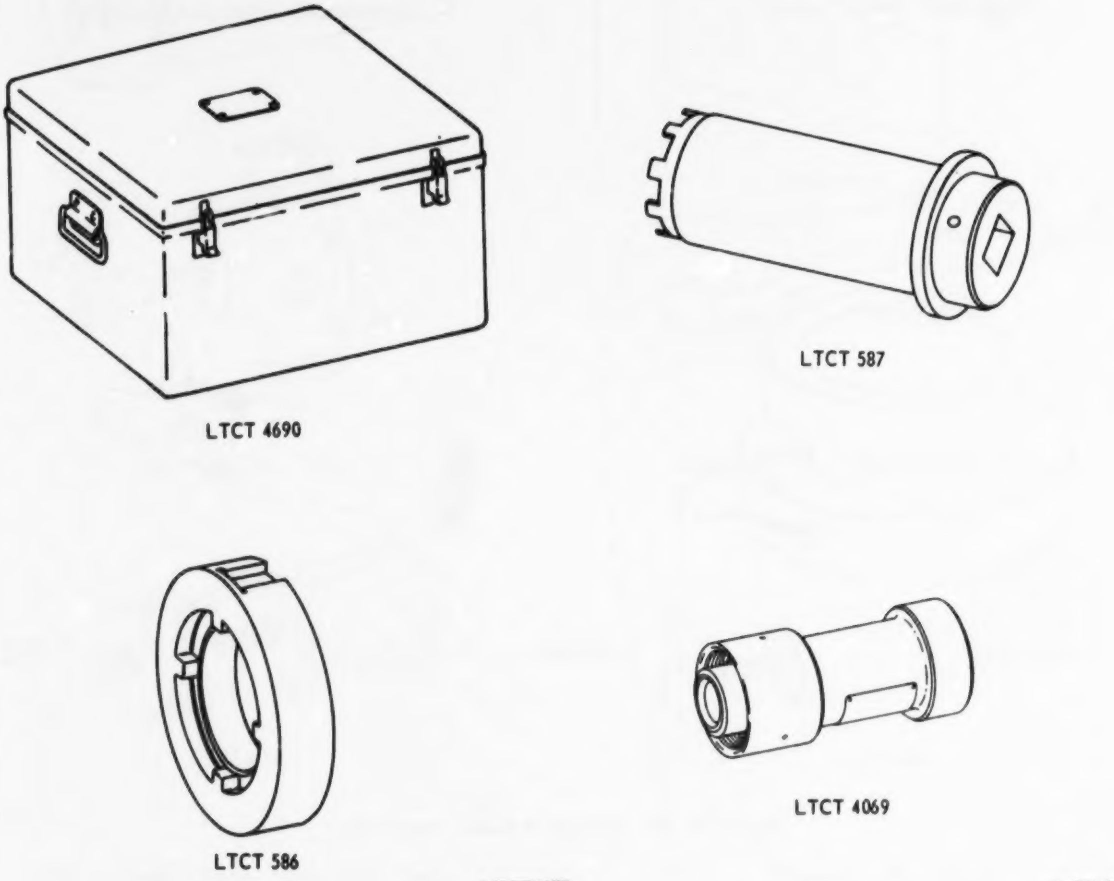


Figure 2-137. Hand Crank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LTCT 586
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Figure 2-138. Holding Fixture

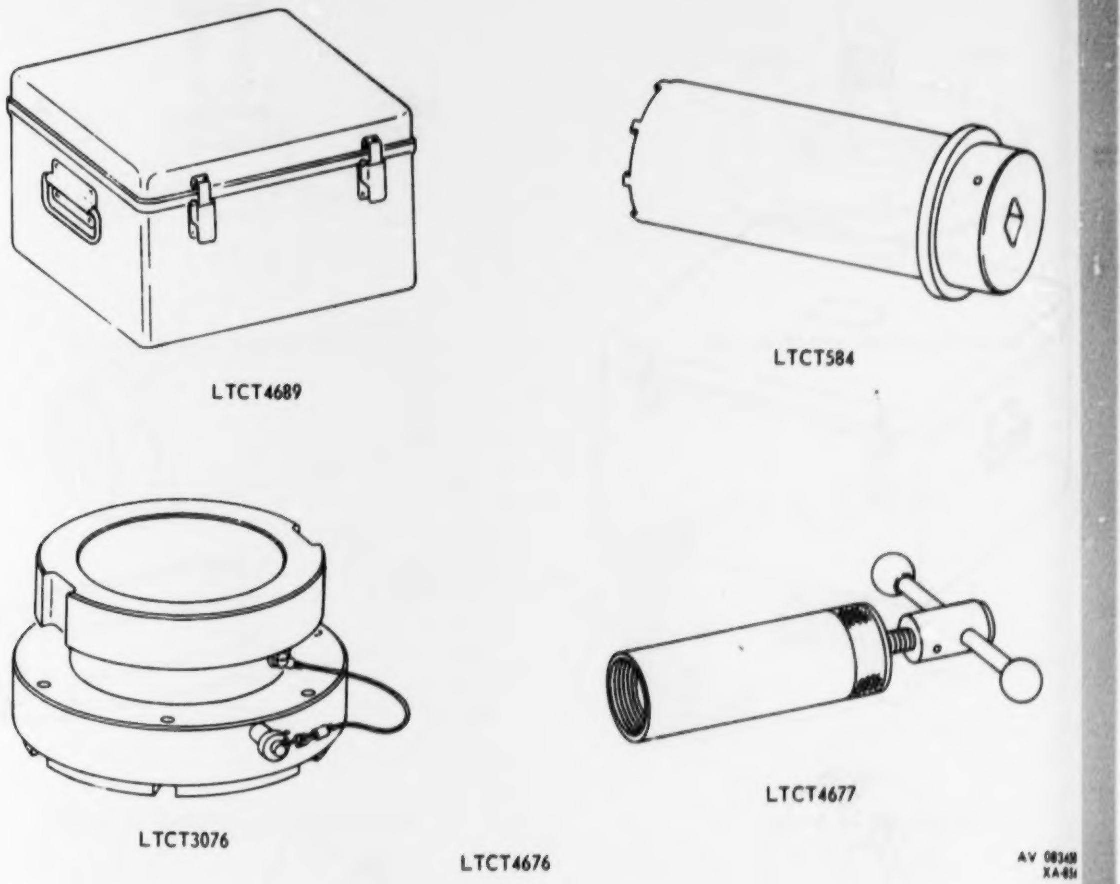
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Figure 2-139. Hub and Adapter Assembly

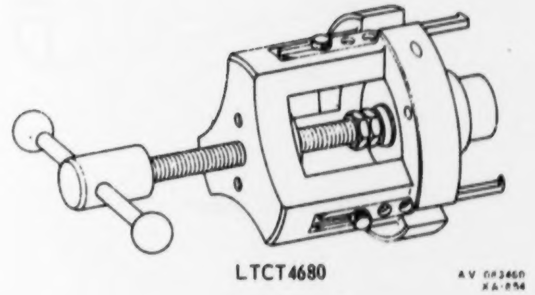
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Figure 2-140. Mechanical Puller

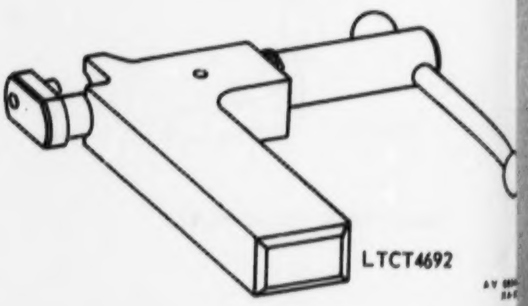
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Figure 2-141. Locating Pin Removal Tool

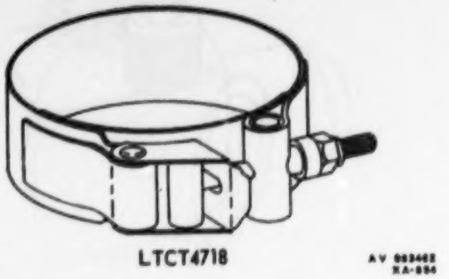


Figure 2-142. Ring Compressor

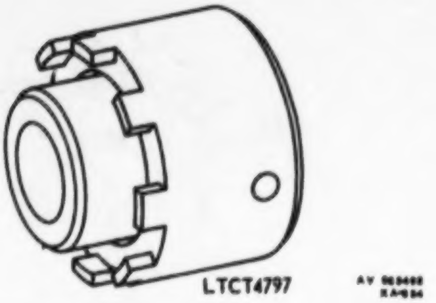


Figure 2-143. Wrench

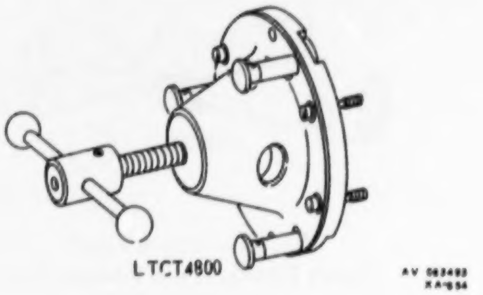


Figure 2-144. Puller

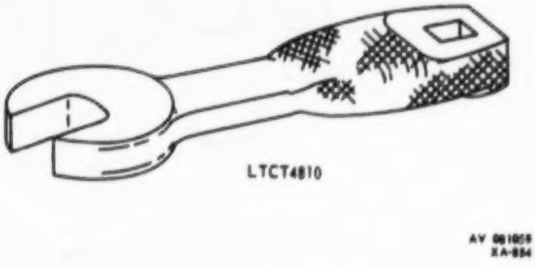


Figure 2-144A. Fuel Harness Wrench

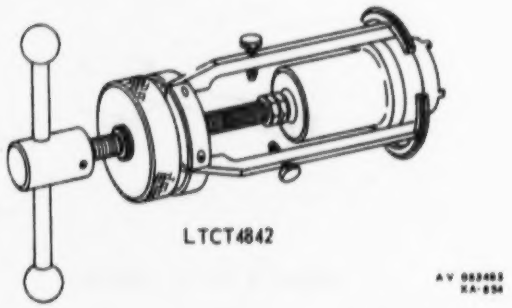


Figure 2-145. Spacer Mechanical Puller

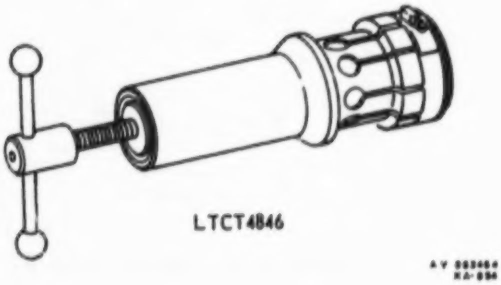


Figure 2-146. Puller

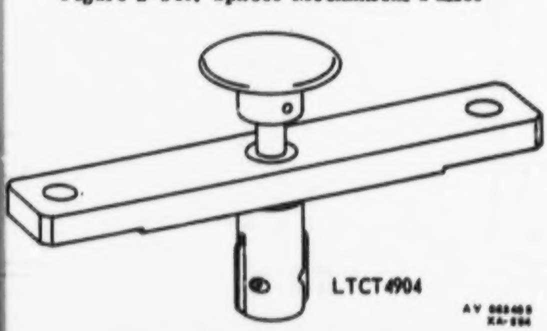


Figure 2-147. Holding Fixture

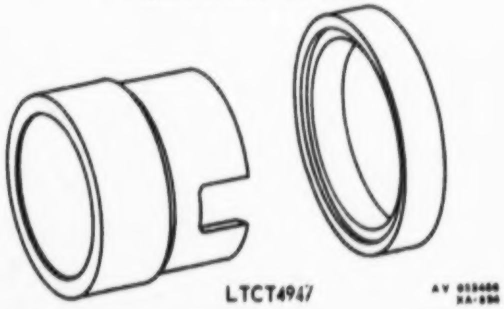


Figure 2-148. Removing and Installing Tool

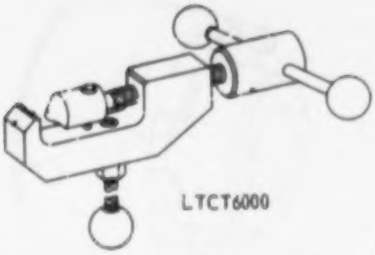


Figure 2-149. Installation Tool

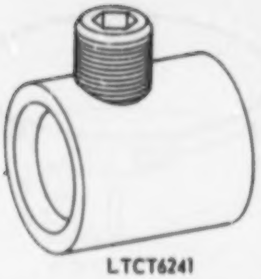


Figure 2-150. Stop Assembly

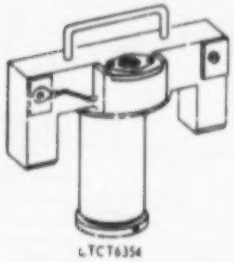


Figure 2-150-1. Bore Heater

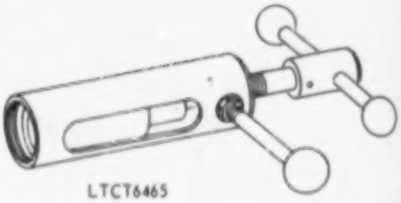


Figure 2-150A. Cone Removal Tool

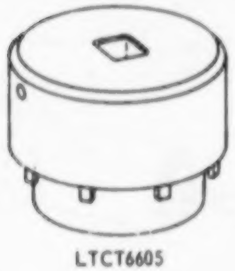


Figure 2-151. Spanner Wrench

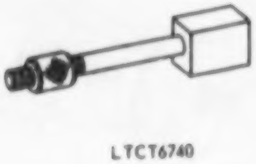
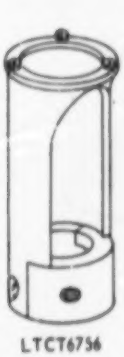


Figure 2-151-1. Adapter



AV 081072
XA-854

Figure 2-151-2. Adapter

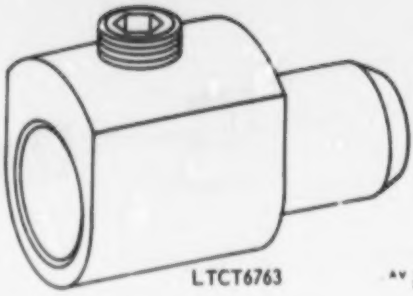


Figure 2-151A. Stop Assembly

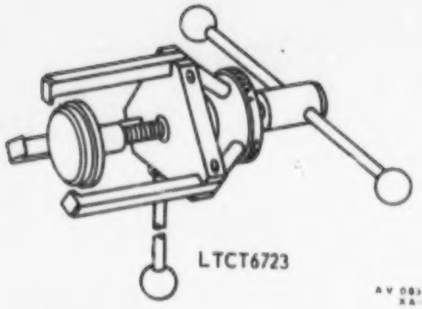


Figure 2-152. Puller

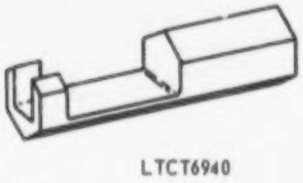


Figure 2-153. Wrench

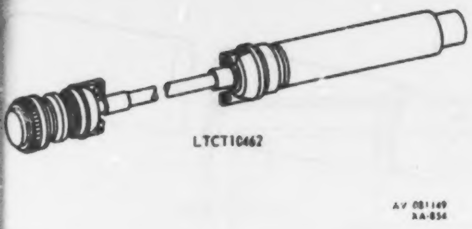

LTCT10462
AV 081149
XA-854

Figure 2-154. Test Lead

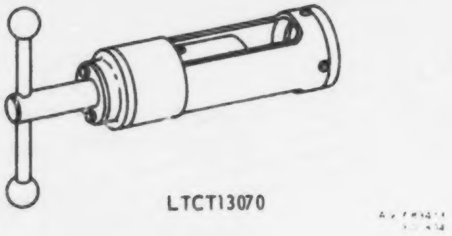


Figure 2-155. Installing Tool

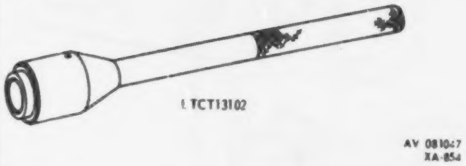

LTCT13102
AV 081047
XA-854

Figure 2-155A. Installation Tool

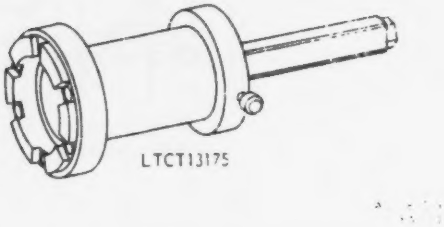


Figure 2-155B. Torque Fixture

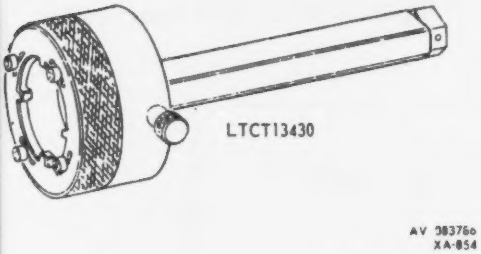

LTCT13430
AV 083756
XA-854

Figure 2-155C. Torque Fixture

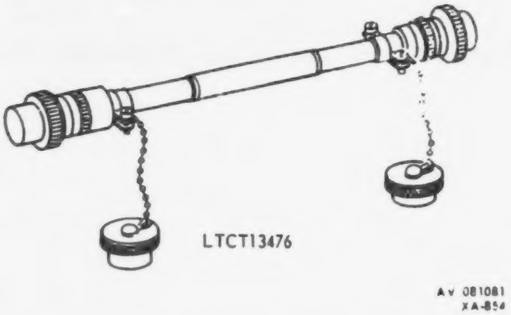

LTCT13476
AV 081081
XA-854

Figure 2-155D. Special Purpose Electrical Cable Assembly

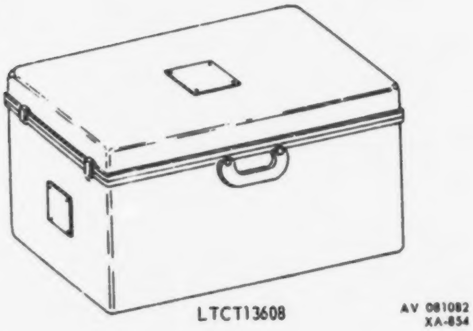

LTCT13608
AV 081082
XA-854

Figure 2-155E. Electric Torquemeter Comparator Test Set

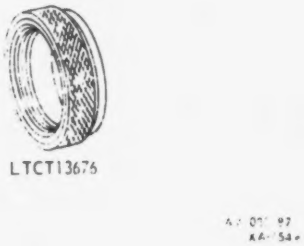


Figure 2-155F. Cone Removal Tool Adapter

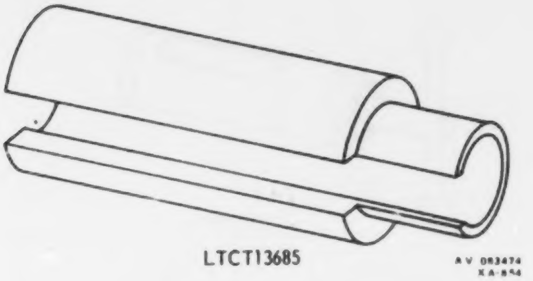

LTCT13685
AV 083474
XA-854

Figure 2-156. Installer

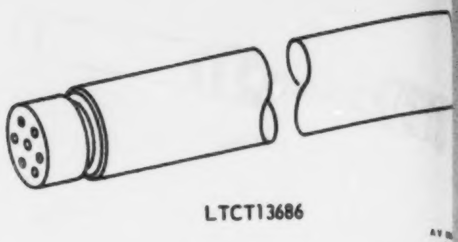


Figure 2-157. Torquemeter Removal Tool

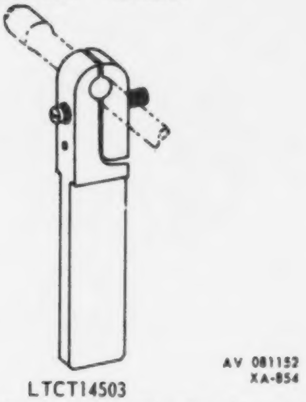

LTCT14503
AV 081152
XA-854

Figure 2-157-1. Clamp Gage, Topping Governor

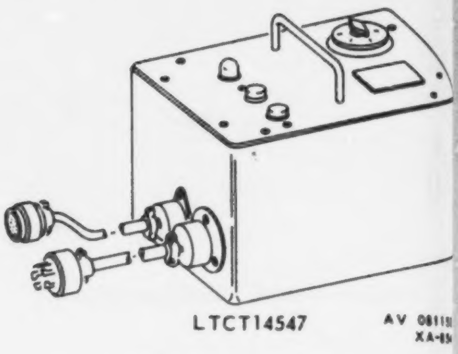

LTCT14547
AV 0811
XA-8

Figure 2-157-2. Bore Heater Control

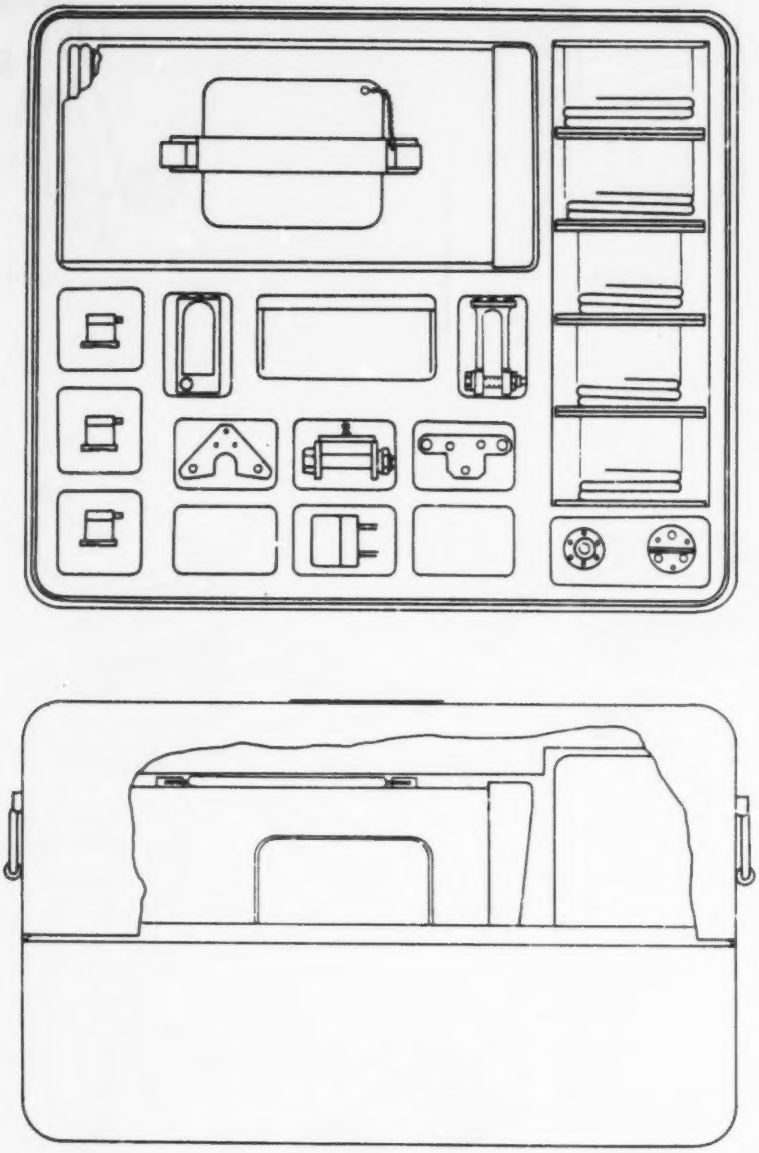
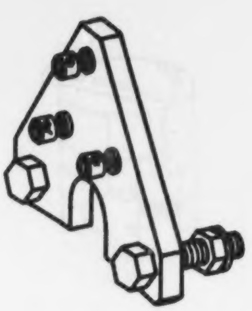
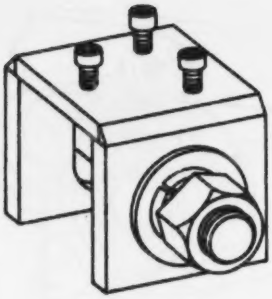

LTCT20596
AV 083390
X-F54

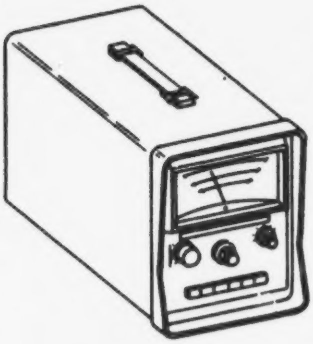
Figure 2-157A. Vibration Test Set, Battery Operated (Sheet 1 of 2)



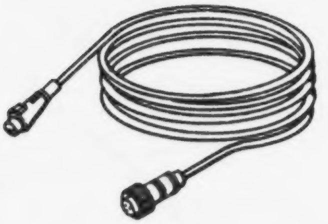
LTCT433



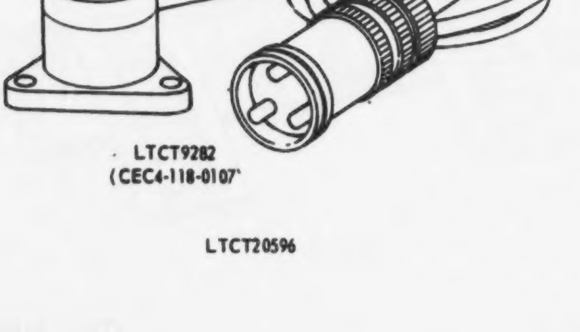
LTCT535



LTCT22031-01
(CEC1-157-0103)



LTCT9283-02
(CEC49657-0300)



LTCT9282
(CEC4-118-0107'

LTCT20596

Figure 2-157A. Vibration Test Set, Battery Operated (Sheet 2 of 2)

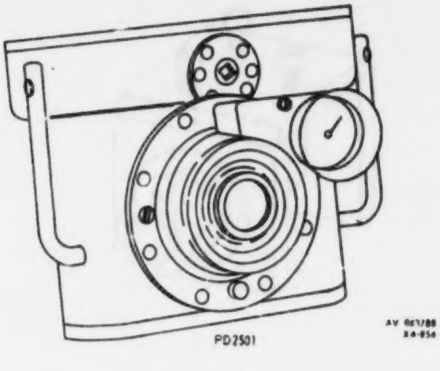


Figure 2-157B. Power Wrench

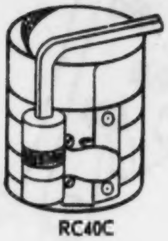


Figure 2-158. Ring Compressor

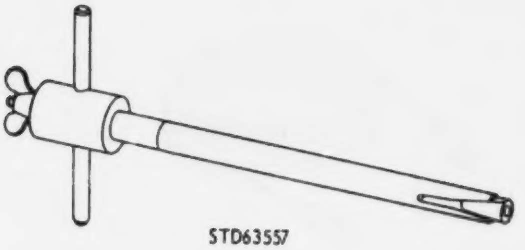


Figure 2-159. Sleeve Puller

Figure 2-160 deleted

Figure 2-161 deleted

Figure 2-162 deleted

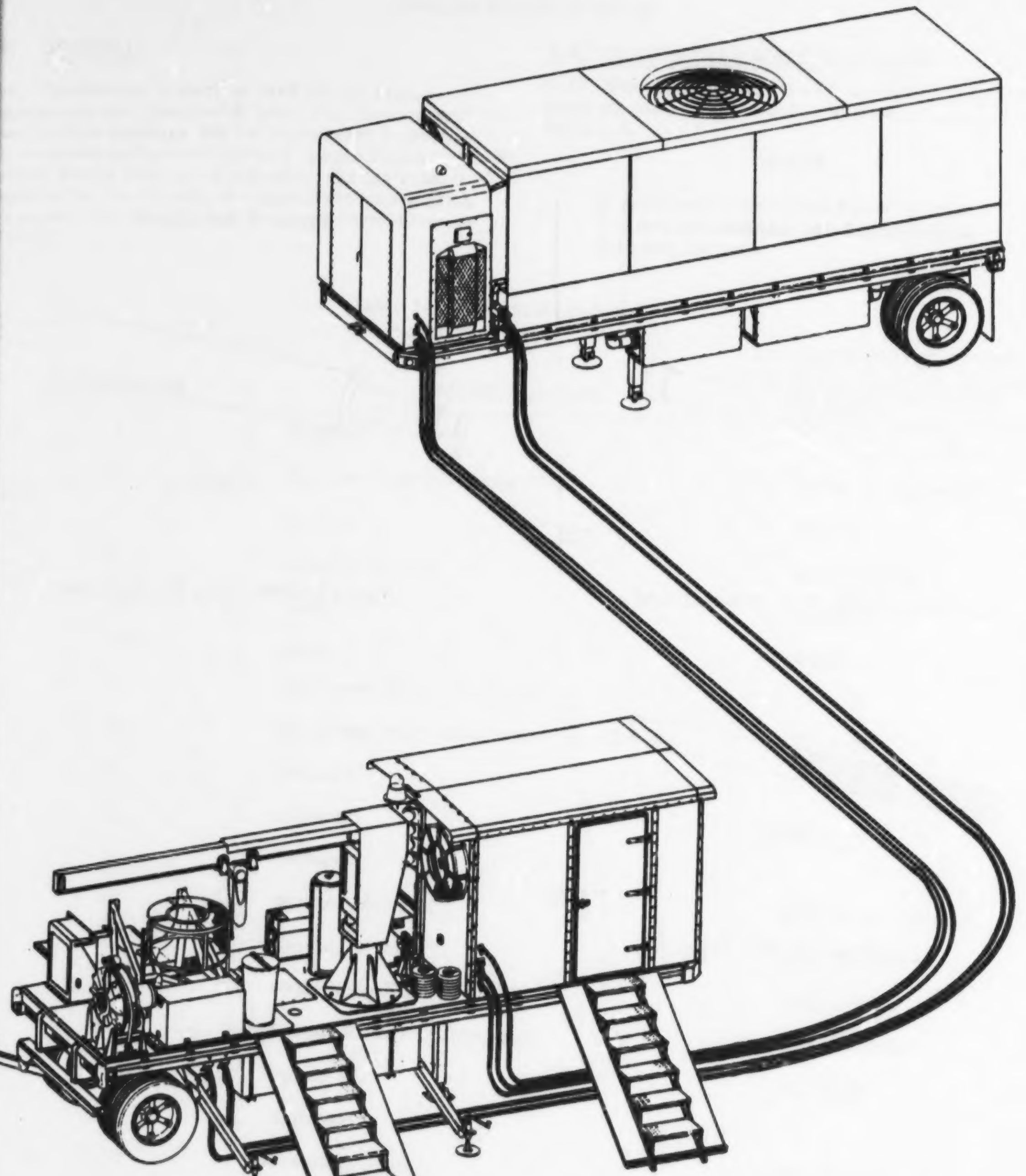

TE12062
AV 083481
XA-854

Figure 2-163. Mobile Trailer Assembly

Figure 2-164 deleted

Figure 2-165 deleted

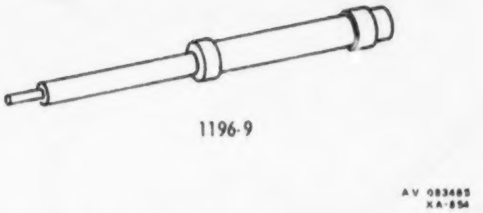

1196-9
AV 083485
XA-654

Figure 2-166. Tang Breakoff Tool

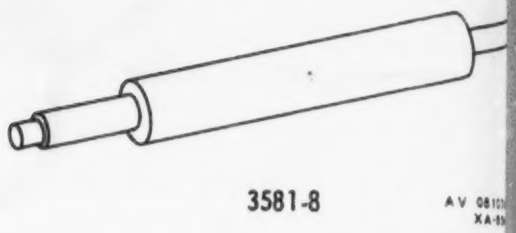

3581-8
AV 081
XA-1

Figure 2-166A. Tang Breakoff Tool

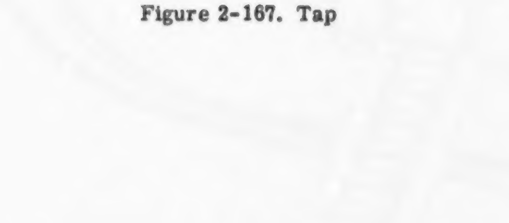

38193-9
AV 083486
XA-654

Figure 2-167. Tap

SECTION II

CONSUMABLE MATERIALS

2-7. GENERAL.

2-8. Consumable materials used during engine maintenance are itemized in table 2-2. Government specification numbers will be interpreted to include all revisions and amendments. If a specification number for an item is not available, the material is identified by its common or commercial designation accompanied by the Federal Code for Manufacturers (FSCM).

2-9. CONSUMABLE MATERIALS LIST.

2-10. Reference to consumable materials in text is made by nomenclature and item number listed in table 2-2.

NOTE

If consumable materials listed in table 2-2 are not available, a suitable equivalent may be used.

Table 2-2. Consumable Materials

ITEM NUMBER	NOMENCLATURE	MILITARY SPECIFICATION, FEDERAL SPECIFICATION, OR MANUFACTURER
1	(Deleted)	
2	Abrasive Grit (Novahone 325)	62755 (or equivalent)
3	Acetone	0-A-51
4	Alkaline Cleaner	MIL-C-25769
4A	Alloy	AMS4769
4B	Alloy	AMS4771
5	Aluminum Oxide (Grade 400)	
5A	Aluminum Paint (Heat Resisting, 1200° F)	TT-P-28
6	(Deleted)	
7	(Deleted)	
8	(Deleted)	
9	Barrier Material	MIL-B-121 Grade A
10	Brazing Alloy	MIL-B-15395
11	Calibrating Fluid (Type II)	MIL-C-7024
12	Carbon Removing Compound	MIL-C-19853
13	Castor Oil	JJJ-C-86
14	(Deleted)	
15	Chemical Film	MIL-C-5541
16	Cleaner (SKC-2)	37676 (or equivalent)
17	(Deleted)	
18	(Deleted)	
19	(Deleted)	

Table 2-2. Consumable Materials (Cont)

ITEM NUMBER	NOMENCLATURE	MILITARY SPECIFICATIO FEDERAL SPECIFICATIO OR MANUFACTURER
20	(Deleted)	
21	Corrosion-Preventive Compound	MIL-C-6529
21A	Corrosion-Preventive Compound	MIL-C-16173, Grade 2
22	(Deleted)	
22A	Corrosion-Preventive Synthetic Resin Varnish	AMS3132
23	Crocus Cloth	P-C-458
24	Cutting Oil	VV-D-241
25	Desiccant	MIL-D-3464, Type III
26	Developer (SKD-4)	MIL-I-25135
27	(Deleted)	
28	Dry Cleaning Solvent	PD-680 (Type I)
28A	Dry Cleaning Solvent	PD-680 (Type II)
29	(Deleted)	
30	(Deleted)	
31	(Deleted)	
32	Ease-Off Lubricant (990)	87889 (or equivalent)
33	(Deleted)	
34	(Deleted)	
35	(Deleted)	
36	(Deleted)	
37	(Deleted)	
38	(Deleted)	
39	(Deleted)	
40	(Deleted)	
41	(Deleted)	
42	Fingerprint Remover	MIL-C-15074
43	(Deleted)	
44	(Deleted)	
45	(Deleted)	
45A	Flux	AMS3410
46	Flux	O-F-499
46A	(Deleted)	
47	Fuel (JP-4 or JP-5)	MIL-T-5624

Table 2-2. Consumable Materials (Cont)

ITEM NUMBER	NOMENCLATURE	MILITARY SPECIFICATION, FEDERAL SPECIFICATION, OR MANUFACTUER
48	(Deleted)	
49	(Deleted)	
50	(Deleted)	
51	Gloss Enamel (Type I)	TT-E-489
52	Glycerol	0-G-491
52A	Graphite Colloidal	MIL-G-26548B
53	Grease	MIL-G-4343
54	Gun Blueing (P/N 10793, Catalog No. 6G-10793)	53800 (or equivalent)
54A	(Deleted)	
55	Iron-Blue Pigment	TT-P-385
56	Lapping Compound (No. 400)	MIL-L-17862
57	Leak Test Solution	MIL-L-25567
58	Liquid Abrasive (Novaculite #200)	70490 (or equivalent)
59	(Deleted)	
60	Liquid Soap Solution	P-S-624
60A	Lockwire	MS 20995C32
60B	Lockwire	MS 20995C20
60C	Lockwire	MS 20995C25
61	Lubricating Oil (Grade 1010)	MIL-L-6081
62	Lubricating Oil	MIL-L-6082
63	Lubricating Oil	MIL-L-23699
64	Lubricating Oil	MIL-L-7808
65	(Deleted)	
66	(Deleted)	
67	Lubriplate	73219 (or equivalent)
68	Magnesium Alloy	AMS4350
69	Magnus (61C)	37733 (or equivalent)
70	Magnus (751)	37733 (or equivalent)
71	Marking Ink (Black No. S1147)	87049 (or equivalent)
72	Marking Pencil (Yellow) (Colorbrite No. 2107) 7510-00-465-0994	73865 (or equivalent)
73	Marks-A-Lot Ink Pencil (Red, Green, Yellow)	71328 (or equivalent)
74	Methanol (Grade A or B)	0-M-232
75	Methyl-Ethyl-Ketone	TT-M-261
76	Molybdenum Disulfide Powder	MIL-M-7866

Table 2-2. Consumable Materials (Cont)

ITEM NUMBER	NOMENCLATURE	MILITARY SPECIFICAT FEDERAL SPECIFICAT OR MANUFACTURE
77	(Deleted)	
78	Molykote Antiseize Thread Compound	94499 (or equivalent)
79	(DELETED)	
80	Nitric Acid	0-N-350
81	Oakite Rust Stripper	44389 (or equivalent)
82	Opco Marker (Blue, Green, Black)	61195 (or equivalent)
83	Penetrant (SKL-3)	37676 (or equivalent)
84	Penetrating Oil	VV-P-216
85	Perchloroethylene	0-T-236
86	(Deleted)	
87	Petrolatum	VV-P-236
88	Plastilube Moly No. 3	02307 (or equivalent)
89	(Deleted)	
90	(Deleted)	
91	Red Lead	TT-R-191
91A	Rust Inhibitor (RUSTLICK 606) (FSCM 14098) or equivalent. NSN 6850-00-066-2333, 5 GL. NSN 6850-00-066-2334, 55 GL.	MIL-C-23411
92	(Deleted)	
93	Sandpaper (#320 Grit)	P-P-101
94	Sealing and Retaining Compound (Grade A)	MIL-S-22473
95	Shortening Compound	EE-S-321
96	(Deleted)	
97	(Deleted)	
98	Sodium Dichromate	0-S-595
99	Sodium Hydroxide	0-S-598
100	(Deleted)	—
101	(Deleted)	
102	Tape, Pneumatic system, identification	L-T-90
103	(Deleted)	
104	(Deleted)	
105	Tape Type IV	PPP-T-60
106	(Deleted)	

Table 2-2. Consumable Materials (Cont)

ITEM NUMBER	NOMENCLATURE	MILITARY SPECIFICATION, FEDERAL SPECIFICATION, OR MANUFACTUER
107	(Deleted)	
108	(Deleted)	
109	(Deleted)	
110	(Deleted)	
111	Transparent Bag	MIL-B-22020
112	Toluol or Toluene	TT-T-548
113	Trichoroethylene (Type II)	0-T-634
114	Trichloroethane	0-T-620
115	(Deleted)	
116	Turco Compound (No. 713)	61102 (or equivalent)
117	Turco Dy/Chek	61102 (or equivalent)
118	Turco Dy/Mark Developer	61102 (or equivalent)
118A	Turco Fluro-Chek DD2	MIL-I-25135
118B	Turco Fluro-Chek WP1	MIL-I-25135
118C	Turco Fluro-Chek WP167	MIL-I-25135
119	Transparent Bag (Type I)	MIL-B-22020
120	(Deleted)	
120A	Water-Soluble Cleaner (B & B3100)	21361 (or equivalent)
121	Welding Wire	AMS5680
122	Welding Wire	AMS5694
123	Welding Wire	AMS5774
124	Alloy Wire, Welding	AMS5786
125	Yellow Marking Pencil	SS-P-201
126	Yellow Opaque Ink (No. 9)	TT-I-558
127	Zinc-Chromate Primer	AMS3110
128	Zinc-Chromate Primer	MIL-P-8585
129	Corrosion-Preventive Concentrate (Brayco 599)	98308 (or equivalent)
130	Sealing Compound 8030-917-993	EC1252
131	Never-Seez Compound Anti-Seiz 8030-00-105-0270	Never-Seez Inc, Chicago, IL NS165

CHAPTER 3

PREPARATION FOR SERVICE, STORAGE, AND ENGINE HANDLING

SECTION I

PREPARATION FOR SERVICE AND STORAGE

3-1. TREATMENT OF ENGINES IN CONTAINERS UPON RECEIPT AT A FACILITY.

3-2. PRESERVATION MAINTENANCE. Preservation maintenance is not represervation, but is the regular inspection and replacement of the dehydrating agent. Allow engine awaiting installation to remain in the dehumidified shipping container as long as possible.

3-3. INSPECTION OF PRESSURIZED CONTAINERS. Immediately upon receipt of an engine at an activity, and every 90 days (or more frequently) thereafter, check relative humidity indicator and internal pressure of container.

NOTE

An all blue color in the humidity indicator indicates a safe condition. As moisture content inside the container increases, the indicator color will change from blue to pink. An all pink condition is considered unsafe and indicates that the desiccant must be changed and the container repressurized.

a. If the humidity indicator indicates that the relative humidity is less than 40 percent and the internal pressure is more than one psig, no maintenance is necessary until the next regular inspection.

b. If the humidity indicator indicates that the relative humidity is less than 40 percent but the internal pressure is less than one psig, the container shall be checked for leakage, using liquid soap (item 80, table 2-2) at all closures. (Refer to TB55-8100-200-23.) When leakage has been corrected, the container shall be repressurized to 5 psig. Use clean dry compressed air. Record date of repressurization and name of activity in appropriate section of engine historical record.

c. If the humidity indicator indicates that the relative humidity is 40 percent or more, an unsafe or corrosive condition exists. Correct as follows:

(1) Depressurize shipping container by opening air filling valve at front of container.

CAUTION

Do not disturb relief valve.

(2) Allow air pressure to return to zero.

(3) Remove capscrews and nuts that secure container halves together.

(4) Remove cover from container and inspect engine to determine its serviceability. Any presence of corrosion on the inlet, or compressor housings, or on other visible exterior surfaces, or on the compressor or turbine blades or vanes is cause to render the engine as unserviceable.

(5) If engine is found to be serviceable, remove it from container and preserve it as outlined in paragraph 3-14 or place it in service.

(6) If unserviceable, inspect and repair to a like-new corrosion free condition per applicable paragraphs within this manual as authorized by Maintenance Allocation Chart. If not repairable, ship engine to Overhaul.

3-4. REMOVAL OF ENGINE FROM SHIPPING CONTAINER.

3-5. DEPRESSURIZING SHIPPING CONTAINER. Open air valve at front of shipping container. (See figure 3-1.) Allow air pressure to decrease to zero.

WARNING

Prior to removing engine from container, make sure both sections of container are grounded and the container is opened in a well-ventilated area.

3-6. REMOVAL OF ENGINE. Proceed as follows:

a. Remove engine records from envelope compartment on container.

WARNING

Make certain that all air pressure has been released before loosening nuts in following step b. If nuts are removed before pressure is released, internal pressure could blow off cover.

b. Remove nuts and bolts that secure upper and lower halves of shipping container.

CAUTION

When removing cover in following step c., ensure upper half of shipping container does not strike engine.

c. Attach a suitable chain to lifting eyes on upper half of shipping container. Using a suitable hoist attached to chain, lift upper half of shipping container from lower half and set to one side. (See figure 3-1.)

d. Insert 7/16 inch diameter by 6-1/2 inch long bolt through diffuser housing mounting boss. Attach two cables from engine sling (LTCT773 or LTCT384), one on each end of bolt. Secure engine sling cables with nuts and 1-1/2 inch diameter washers.

e. Insert 7/16 inch diameter by 5 inch long bolt through inlet housing mounting boss. Attach two cables from engine sling (LTCT773 or LTCT384), one on each end of bolt. Secure engine sling cables with nuts and 1-1/2 inch diameter washers.

f. Attach engine sling to suitable hoist.

g. Remove nuts and washers that secure four shipping trunnions to four shock-resistant mounts in lower half of shipping container.

CAUTION

When removing engine from container in following step h., ensure that engine does not strike shipping container.

h. Remove engine from shipping container.

hA. Remove desiccant from desiccant bask

i. Remove shipping trunnions from engine m pads.

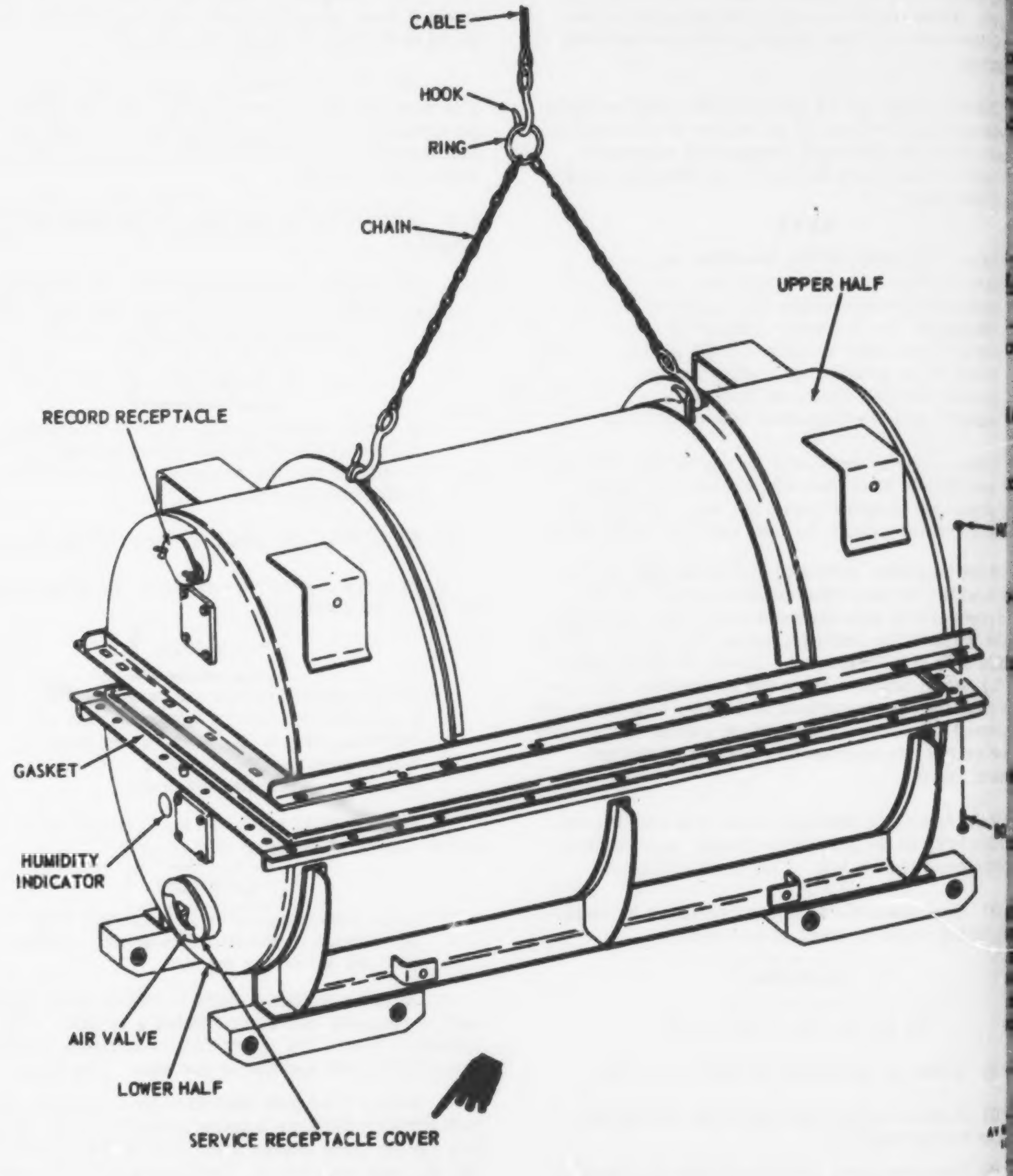

CABLE
HOOK
RING
CHAIN
UPPER HALF
RECORD RECEPTACLE
GASKET
HUMIDITY INDICATOR
AIR VALVE
LOWER HALF
SERVICE RECEPTACLE COVER

Figure 3-1. Removing Shipping Container Cover

Reinstall shipping trunnions in bottom half of shipping container.

CAUTION

Shipping trunnion bolts are not to be used for installation of engine into airframe.

k. Lower top half of shipping container onto bottom half. Install four bolts and nuts, one at each corner, and finger-tighten. Check alignment of top and bottom halves of shipping container and alignment of upper and lower flange bolt holes.

l. Install bolts and nuts at midpoints of sides and ends of shipping container flanges, and the bolts and nuts at the midpoints between them; then install all remaining bolts and nuts. Tighten bolts sufficiently to prevent loosening.

m. Install service receptacle cover.

n. (Deleted)

-7. INSPECTION OF ENGINE DROPPED DURING HANDLING.

-8. If the engine is dropped during handling, perform the following inspection and tests:

a. Inspect accessory drive gearbox for cracked flanges.

b. Inspect overspeed governor and tachometer drive for cracks, distortion, and bent shafts.

c. Inspect oil filter for damage.

d. Inspect power-driven rotary (oil) pump for loose bolts and cracked flanges.

e. Inspect fuel control assembly for cracked flanges.

f. Inspect engine mounting pads for cracks.

g. Check air, oil, and fuel hose connections for security.

h. Check all accessories for loose bolts, nuts, and connections.

i. If no visual damage is apparent, engine may be operationally checked either in airframe or in mobile engine test unit. (Refer to Chapter 10.) Minimum test run is 30 minutes, and vibration test must be performed. Vibration levels must be within established limits. If no defects are noted, engine is considered serviceable.

-9. (Deleted)

-10. (Deleted)

-11. (Deleted)

3-12. ACTIVATION OF ENGINES AFTER STORAGE.

Activate the engine as follows:

a. Remove bleed band, inlet and exhaust covers, and barrier material.

b. Inspect openings for foreign material and corrosion. Wipe clean with drycleaning solvent (item 28, table 2-2).

c. (Deleted)

d. (Deleted)

e. Disconnect 28-vdc power supply from ignition unit to prevent accidental firing of engine.

f. Set power lever to ground idle position.

g. Disconnect main fuel hose from flowmeter and starting fuel hose from starting fuel manifold. Install temporary hoses and insert ends into a container having approximately 2-gallon capacity.

h. Check oil level; service, if necessary.

CAUTION

To prevent damage to starter, do not exceed starter limitations when motoring engine in following step i.

i. Operate aircraft boost pump to prime fuel system and motor engine with starter.

NOTE

Engine lubrication system is fully primed when oil pressure gage shows a steady positive indication.

j. Move power and condition levers to maximum and actuate starting fuel solenoid until clean fuel, with no air bubbles, is observed flowing from temporary hoses into container. At least one gallon of fuel must flow into container.

k. Connect main fuel hose to flowmeter and starting fuel hose to starting fuel manifold and inspect engine for leakage.

l. Connect 28-vdc power supply to ignition unit. Lockwire connector.

m. Start engine and operate for 5 minutes at approximately 75 percent N1 speed.

n. Shut down engine.

o. Remove oil filter cover assembly. Check for excessive contamination, clean, reassemble, and reinstall. (Refer to paragraph 5-107 through 5-111.)

p. Remove chip detector. Check for excessive contamination, clean, and reinstall.

q. Remove pump discharge strainer and servo supply filter (T53-L-7/7A engines) or fuel inlet strainer and servo filter and strainer assembly (T53-L-15/701 engines) from fuel control. Check for contamination, clean, and replace. (Refer to paragraphs 5-68 or 5-70, 5-69 or 5-72, and 5-71 or 5-73.)

r. If no contamination is evident, engine is ready for ground test.

s. If oil system contamination is slight, drain the oil and refill system with new oil.

t. Repeat preceding steps m. through p. If there is evidence of continued contamination, refer to paragraph 4-6.

NOTE

In addition to requirements specified above, a vibration test must be performed. (Refer to paragraph 10-16.)

3-13. (Deleted)

3-14. PRESERVATION OF ENGINE.

3-15. PRESERVING ACCIDENT-INVOLVED ENGINES. Engines removed from an aircraft that has been involved in an accident in which engine failure or malfunction is known or suspected to have been a factor should not be treated with corrosion protective. No attempt should be made to operate, motor, or disassemble an accident-involved engine. All accident-involved engines must be transported to an overhaul depot or a designated investigation area within ten days after the accident.

a. Without disconnecting lines or fittings, make every effort to prevent remaining fuel and oil in engine from leaking out.

b. Plug all ports and cap all fittings and lines. Seal opening with applicable covers.

c. Install engine in bottom half of metal reusable shipping and storage container in accordance with paragraph 3-17. Ground engine to container to prevent a possible explosion of dangerous vapors which may be ignited by static electricity or a spark. Secure all loose metal components to the container with tape PPP-T-60 to prevent a possible spark during shipment.

3-16. PRESERVING DAMAGED, CANNIBALIZED, OR FAILED ENGINES. Inoperable engines that are idle because they require parts, maintenance, or overhaul, shall be preserved and stored in a metal reusable shipping and storage container, or in a clean, dry area adequately protected from dirt and physical damage.

3-17. PRESERVATION OF AND INSTALLATION ENGINE IN A METAL REUSABLE SHIPPING AND STORAGE CONTAINER. All engines,, which are pared for storage or shipment, will be preserved packed in a metal reusable shipping and storage tainer, P/N 8115-CON-024-1, FSN 8115-772-7 accordance with the following procedures:

WARNING

The fuel system of all engines that are to be placed in containers (less accident-involved engines) will be thoroughly drained, purged, and preserved. All disconnected lines will be capped or plugged. Tape will not be used in lieu of caps or plugs.

a. Remove exhaust cone, if installed.

b. Preserve operable engine as follows:

(1) Add corrosion-preventive concentrate 129, table 2-2) to the engine oil system in the ties prescribed in TB 55-9150-200-25. Flushing the engine oil system is not required during acti of the engine after storage. Check oil level and engine oil system if necessary.

(2) Disconnect 28-vdc power supply from ignition unit.

(3) Remove fuel inlet strainer and servo fi and strainer assembly (T53-L-15/701 engines) or pump discharge strainer and servo supply filter L-7/7A engines) from the fuel control. (Refer to paragraph 5-68 or 5-71.)

(4) Clean with drycleaning solvent (item 2 table 2-2); then reinstall fuel inlet strainer and filter and strainer assembly (T53-L-15/701 eng or pump discharge strainer and servo supply filte (T53-L-7/7A engines). (Refer to paragraphs 5-7 5-73.)

(5) Preserve compressor blades with r hibitor and preservative (item 91A, table 2-2). 16-ounce aerosol can with snorkel tube, spray pressor blades as follows:

(a) Using starter, motor engine to st rpm. With power lever off, apply the materi engine coasts down.

(b) Hold the aerosol can and snorkel so that it projects into the areas between inlet ing struts. Direct the jet stream between any inlet guide vanes onto the rotating compressor Move the jet stream from the base to the tip of blades, which will ensure that the material co much of the blades as possible.

(c) Apply jet stream for 30 seconds.

(6) (Deleted)

(7) Disconnect main fuel hose from the main l manifold (T53-L-7 and L-7A series engines) or w divider assembly (T53-L-15 and L-701 series gines) start fuel hose from start fuel manifold and overspeed governor bleed line. Install temporary e on end of hoses to allow drainage into suitable ntainer. Attach a hose from a source of lubricating (item 61, table 2-2) to fuel control inlet fitting.

(8) With the power lever arm in the full open sition, motor engine with starter (an APU may be d to allow for a higher starter speed) to pump ricating oil into the fuel control. Open starting l solenoid while motoring. Continue motoring il lubricating oil is observed draining from starting fuel hose, at this time close the start fuel sole- d valve. Allow oil to then drain from the main l hose.

NOTE

Initial procedures may require the fuel control change-over solenoid to be in the emergency position until oil starts to flow from the oil storage container.

(9) (Deleted)

(10) (Deleted)

(11) Disconnect lubricating oil hose from fuel trol and connect fuel inlet line.

(12) Remove temporary lines from fuel hoses connect main fuel hose to flowmeter.

(13) Connect starting fuel hose to starting fuel ifold.

(14) (Deleted)

(15) Reconnect 28-vdc power supply to ignition unit. Lockwire connector.

(16) Install engine intake protector (LTC T862) and exhaust cover.

(17) Seal the gap between the bleed band and compressor housing by encircling the engine with a narrow strip of barrier material (item 9, table 2-2) and seal with tape (item 105, table 2-2).

(18) Visually check entire engine. Plug all holes, cap all ports, and check that external parts are complete and secure. Bare metal, including internal and external threads, should be covered with a film of corrosion-preventive compound (item 21A, table 2-2). Spray exposed portion of propeller shaft with lubricating oil (item 63, table 2-2).

(19) Record date of preservation, and maintenance during preservation, on engine historical form (DA Form 2408-13). In addition, annotate records that a corrosion-preventive concentrate has been added to the engine oil system in accordance with TB 55-9150-200-25, and that flushing is not required during activation.

c. Preserve inoperable engine as follows:

(1) Disconnect all fuel lines and drain plugs from fuel control.

(2) Drain all fuel from fuel control and fuel hoses.

(3) Remove fuel inlet strainer and wash-flow servo filter assembly (T53-L-15/701 engines) or pump discharge strainer and servo supply filter (T53-L-7/7A engines) from fuel control. (Refer to paragraphs 5-68 and 5-71.) Clean with drycleaning solvent (item 28, table 2-2), inspect and reinstall. (Refer to paragraphs 5-70 and 5-73.)

(4) Remove topping governor from fuel regulator. Drain Fuel. (Refer to paragraph 5-74 or paragraph 3-42.)

(5) Reinstall all lines and plugs.

(6) Lockwire power lever arm in closed position.

(7) Pour lubricating oil (item 61, table 2-2) into openings made accessible by removal of topping governor until regulator is filled.

(8) Pour lubricating oil into topping governor while rotating drive shaft by hand.

(9) Reinstall topping governor. (Refer to paragraph 5-78 or 9-30.)

(10) Preserve compressor blades with rust inhibitor and preservative (item 91A, table 2-2), using 16-ounce can and snorkel tube.

(10A) Spray the aerosol material in the area between the inlet housing struts and direct the jet stream evenly on all compressor blades.

(10B) Apply jet stream for 30 seconds.

(10C) Spray turbine rotors through exhaust with sufficient amount of lubricating oil (item 63 or 64, table 2-2) to cover blades.

(11) Remove starter unit and all airframe accessories. (Refer to applicable Airframe Manual.)

(12) Close all openings with proper shipping covers, caps and plugs. (See figures 3-6 and 3-7.)

(13) Seal the gap between the bleed band and compressor housing by encircling the engine with a narrow strip of barrier material (item 9, table 2-2) and seal with tape (item 105, table 2-2).

NOTE

Prior to installation of starter drive spline cover in following step (14), lubricate starter drive spline socket with liberal amount of Plastilube Moly No. 3 (item 88, table 2-2). Do not pack socket.

(14) Visually check entire engine. Plug all holes, cap all ports, and check that external parts are complete and secure. Bare metal, including internal and external threads, should be covered with a film of corrosion- preventive compound (item 91A, table 2-2). Spray exposed portion of propeller shaft with lubricating oil (item 63, table 2-2).

(15) Record date of preservation, and maintenance during preservation, on engine historical form (DA Form 2408-13).

d. Installation of engine in container.

(1) Release air pressure in shipping container, and remove shipping container flange nuts and bolts.

(2) Using a suitable hoist and chain, remove upper half of shipping container. (See figure 3-1.) Remove container gasket.

(3) Clean mating flange surfaces and interior of shipping container with a wire brush and broom or with a vacuum cleaner.

(4) File smooth any rough projections found on flanges. Examine sealing gasket; discard and replace if badly cracked. Clean and dry gasket; then apply a light coat of glycerol (item 52, table 2-2).

(5) Place gasket on flange of lower half of shipping container.

CAUTION

Make certain that gasket does not twist lengthwise.

(6) Check all bolts and nuts on shock mounts for tightness.

(7) Remove the igniter plugs, attach to ignition leads, and install sealing caps. Plug igniter openings. Secure leads to support cone with tape (item 105, table 2-2).

(8) Remove fore and aft engine mounting brackets from container.

(9) Install gaskets on container mounting brackets to prevent metal- to-metal contact between engine mounting pads and corresponding container brackets.

NOTE

Prior to installation of mounting brackets on inlet housing in following step (10), inspect inserts in inlet housing mounting pads to ensure that tangs of inserts are broken off. If tangs are not broken off, use tang breakoff tool, 3581-8, to break off tangs. Retrieve broken off tangs with magnet.

(10) Bolt engine mounting brackets to engine pads and lockwire.

(11) Clean off engine as much as possible.

(12) Check condition of humidity indicator. Replace humidity indicator.

(13) Place 48 units of desiccant (item 25, table 2-2) in basket at bottom of shipping container.

(14) Insert a 7/16 inch diameter by 5 inch long stud through inlet housing mounting boss. Position engine sling (LTCT773 or LTCT384) on each end of stud. Secure engine sling cables with 1-1/2 inch diameter washers and nuts.

(15) Insert a 7/16 inch diameter by 6-1/2 inch long stud through diffuser housing mounting boss. Position engine sling on each end of stud. Secure engine sling cables with 1-1/2 inch diameter washers and nuts.

(16) Using suitable hoist attached to engine sling, carefully guide engine into place. Bolt engine mounting brackets to corresponding container brackets. Remove engine sling.

(17) Using suitable chain and alignment pins, lower top half of shipping container onto bottom. Install four bolts and nuts, one at each corner, and finger-tighten. Check alignment of top and bottom halves of shipping container, and upper and lower flange bolt holes. Remove chain.

(18) Install bolts and nuts at midpoints of sides and ends of shipping container flanges, and at midpoints between them; then install all remaining bolts and nuts. Tighten, in order of installation, to 500 to 550 pound-inches torque.

(19) Using clean dehydrated air, pressurize shipping container at 4 to 6 psi. Check container seals to ensure they are airtight, by applying liquid soap (item 60, table 2-2) and observing for bubbles. If container is not airtight, refer to TB 55-8100-200-25 for corrective procedures.

(20) Place completed engine records in record receptacle. Replace cover.

(21) Fasten a bonding seal through record holder cover plate wingnuts, and a seal through shipping container flange.

(22) Install receptacle service cover.

Table 3-1. Shipping Container Leading Particulars.

Length	74-5/8 inches
Width	39-3/4 inches
Height	43-1/8 inches
Weight of Shipping Container	657 pounds (approx)
Combined Weight of Engine and Shipping Container	1212 pounds (approx) (T53-L-7) 1348 pounds (approx) (T53-L-701) 1265 pounds (approx) (T53-L-15)

3-18. (Deleted)

3-19. (Deleted)

3-20. (Deleted)

3-21. PRESERVATION OF UNINSTALLED FUEL C TROL. When a fuel control has been removed f engine and will not be reinstalled in 48 hours pr follows:

CAUTION

The fuel control is considered a high value item and must be secured in a shipping containe and adequately packed for shipment. Exercise extreme care in handling the temperature sensing element housing. Mashing, dents, or sharp bends will destroy the capillary action of the tube.

a. Preferred Method.

(1) Thoroughly clean the fuel control shaft, m flange, topping governor drive shaft port, and all threaded with solvent (item 28, table 2-2). Blow out all crevices wi filtered compressed air. Air dry or wipe with a clean li cloth.

(1A) Remove servo supply filter and pump dis strainer (T53-L-7/7A engines) or fuel inlet strainer and se ter and strainer assembly (T53-L-15/701 engines). (Re paragraph 5-68 or 5-71). Allow fuel to drain from fuel re

(1B) Install high pressure caps on main and st fuel outlet and inlet fittings and on pump discharge pr ports.

(2) Attach a hose from a source of clean unused cating oil (item 61, table 2-2) to the fuel control inlet po

(3) Position the fuel control in operating attitu

(4) Using a rotary air gun and a spline adapter, will not damage the fuel control N1 drive, motor the fuel c at 250 to 350 rpm. Continue until fuel is flushed out by oil the throttle shaft several times while flushing.

NOTE

Drive fuel control N1 drive in counterclockwise direction of rotation. Drive adapter can be made of heavy rubber hose or a spline welded to a standard 3/8-inch square socket or adapter.

CAUTION

Controls, preserved in the above method, must be flushed with fuel prior to engine test. Failure to do this will result in varnish deposits on fuel nozzles.

(5) Reinstall servo supply filter and pump dis- ge strainer (T53-L-7/7A engines) or fuel inlet iner and servo filter and strainer assembly (T53- /701 engines). (Refer to paragraph 5-70 or 5-73.)

(6) If the fuel control is serviceable and is to be ed for a short period of time, place the fuel con- in a plastic bag and store in a clean dry area.

(7) If the fuel control is servicable and is to be ped or either the fuel regulator or the topping nor is defective, remove the topping governor cordance with paragraph 5-74 or 3-42. Package efective component in accordance with paragraph or 3-23. If either component is serviceable and t to be shipped, package it in accordance with ragraph 6 above.

Alternate Method

(1) Clean the fuel control in accordance with ragraph a(1) above.

(2) Remove servo supply filter and pump dis- e strainer (T53-L-7/7A engines) or fuel inlet er and servo filter and strainer assembly (T53- /701 engines). (Refer to paragraph 5-68 or 5-71.) fuel to drain from fuel regulator.

(3) Install high pressure caps on main and start- el outlet and inlet fittings and on pump discharge ure ports.

(4) Pour lubricating oil (item 61, table 2-2) into ontrol through pump discharge strainer port.

(5) Rotate fuel control pump drive by hand.

(6) Turn fuel control over several times to allow ating oil to penetrate all sections.

(7) Reinstall servo supply filter and pump dis- e strainer (T53-L-7/7A engines) or fuel inlet er and servo filter and strainer assembly (T53- /701 engines). (Refer to paragraph 5-70 or 5-73.)

(8) Package the fuel control in accordance with agraph a(6) or (7) above.

PACKAGING FUEL REGULATOR FOR SHIP- . The shipping container for the fuel regulator andard type, P/N 85585. Package fuel regulator ipment as follows:

NOTE

Preserve fuel regulator in accordance with paragraph 3-21 as applicable.

Cap and plug fuel regulator openings. (See 3-2.)

Mount fuel regulator on plate (11, figure 3-3), ut (13), washer (12), and bolt (10).

Wrap T1 sensor with barrier material (item 9, -2) or equivalent.

d. Secure sensor to plate (11) with clamps.

e. Position lower dunnage (8), fuel regulator, and upper dunnage (14) in shipping container (7).

f. Place humidity indicator (15) on top of upper dunnage (14).

g. Insert 32 units of desiccant (9) in shipping container (7).

h. Place cover (5) over gasket (6) on shipping container (7), and seal locking ring (4), nut (1), washers (2), and bolt (3).

i. Store in upright position.

3-23. PACKAGING TOPPING GOVERNOR FOR SHIPMENT. The shipping container for the topping governor is a standard type, P/N 85586. Package govern or for shipment as follows:

a. If the topping governor has not been preserved, fill with lubricating oil (item 61, table 2-2) and drain.

b. Cap and plug governor openings. (See figure 3-4.)

NOTE

The topping governor linkage should be placed in the shipping container with the governor.

c. Position lower dunnage (8, figure 3-5), governor, and upper dunnage (10) in shipping container (7).

d. Place humidity indicator (11) on top of upper dundage (10).

e. Insert 16 units of desiccant (9) in shipping container (7).

f. Place cover (5) over gasket (6) on shipping container (7), and seal with locking ring (4), nut (1) washers (2), and bolt (3).

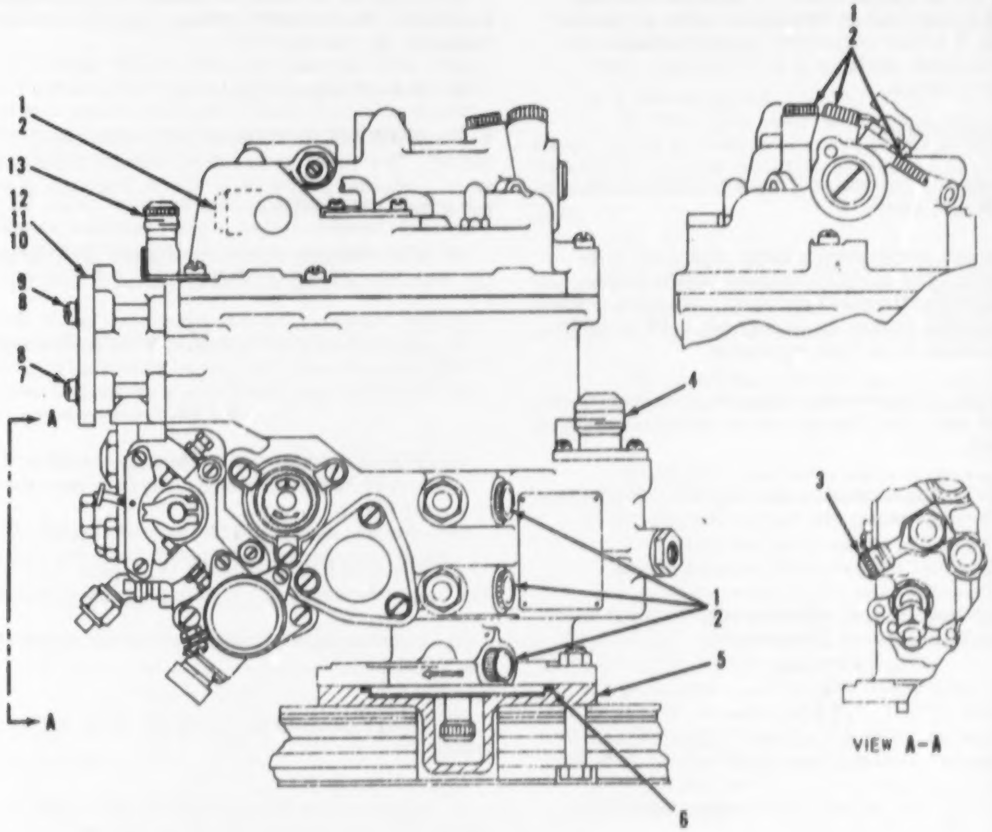
g. Store in upright position.

3-24. (Deleted)

3-25. (Deleted)

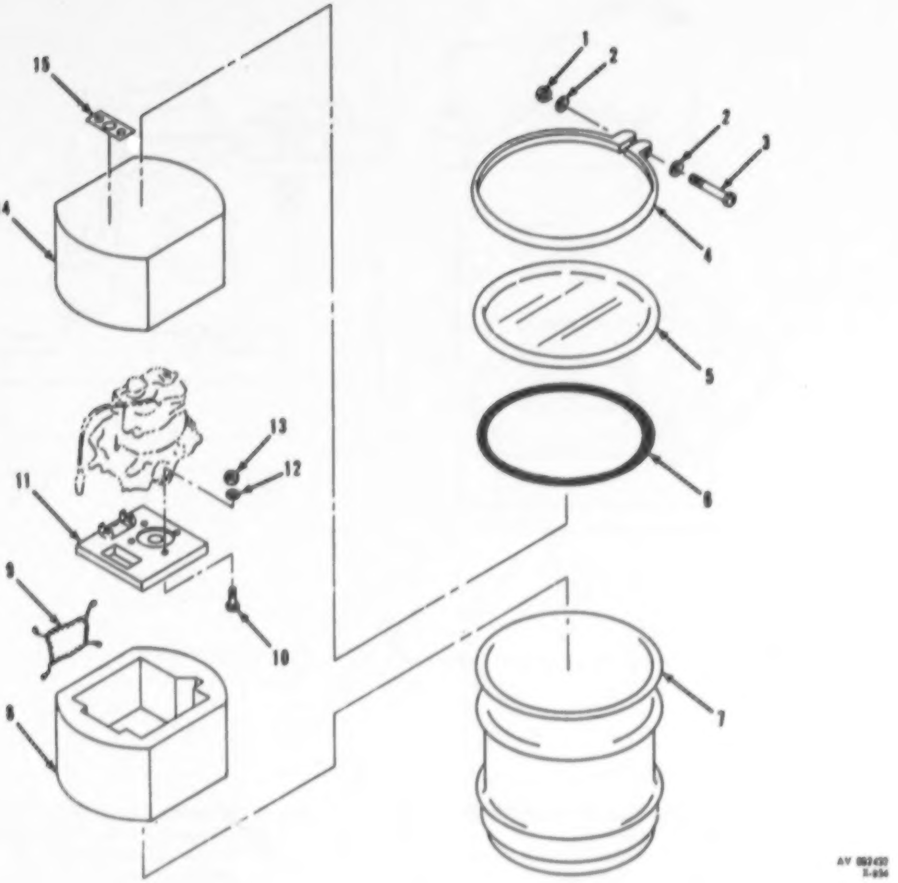
3-26. MARKING ALL SHIPPING CONTAINERS FOR SHIPMENT.

3-27. Shipping containers shall be marked in accordance with Military Standard MIL-STD-129. Special markings shall reflect required information, and shall also conform to procedures reflected in MIL-STD-129. (For marking locations, see figure 3-8.)



1. Shipping Plug (UNF-3B.4375-24)
2. Packing (MS29512-04)
3. Shipping Cap (UNF-3B.4375-20)
4. Shipping Cap (UNF-3B.875-14)
5. Shipping Cover (P/N 78339)
6. Packing (MS29513-152)
7. Screw (AN500AD416-32)
8. Washer (AN960C416L)
9. Screw (AN500AD416-12)
10. Packing (P/N 28992-010)
11. Seal (P/N 86014)
12. Shipping Cover (P/N 77382)
13. Shipping Cap (UNF-3B.5625-18)

Figure 3-2. Fuel Regulator Protective Caps and Plugs



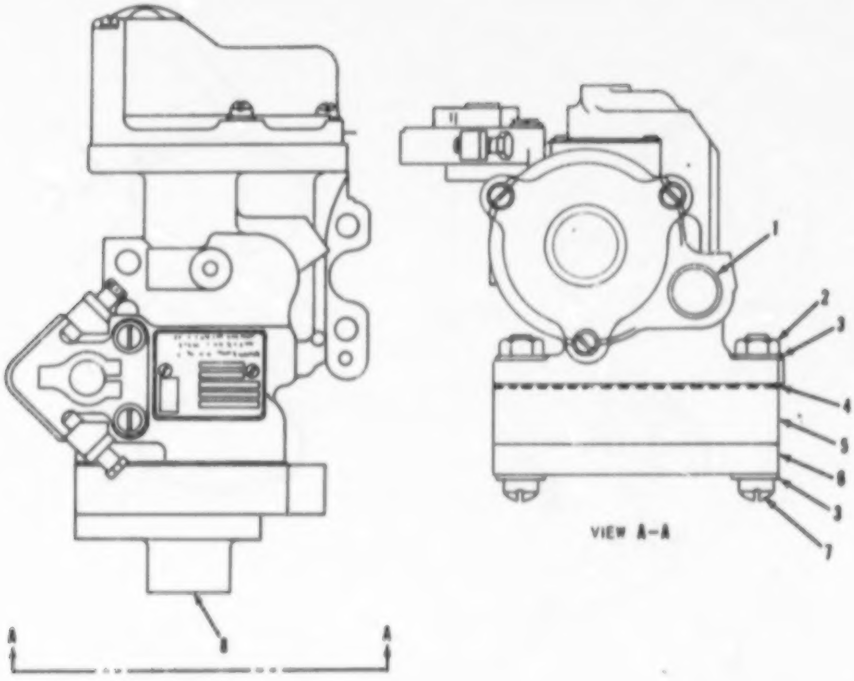
1. Nut (AN335-5)
2. Washer (AN960C516L)
3. Bolt (AN75A27)
4. Locking Ring (MS24209-31)
5. Cover (MS24209-21)
6. Gasket (MS24209-41)
7. Shipping Container (MS24209-11)
8. Lower Dunnage (P/N 85585-1)

* 9. Desiccant (MIL-D 3464)
10. Bolt (1/4-20, 0.750 thread length, 2.0 inches long)
11. Plate (P/N 85585-3)
12. Washer (AN960-416)
13. Nut (1/4-20)
14. Upper Dunnage (P/N 85585-2)

*15. Humidity Indicator (MS20003-2)

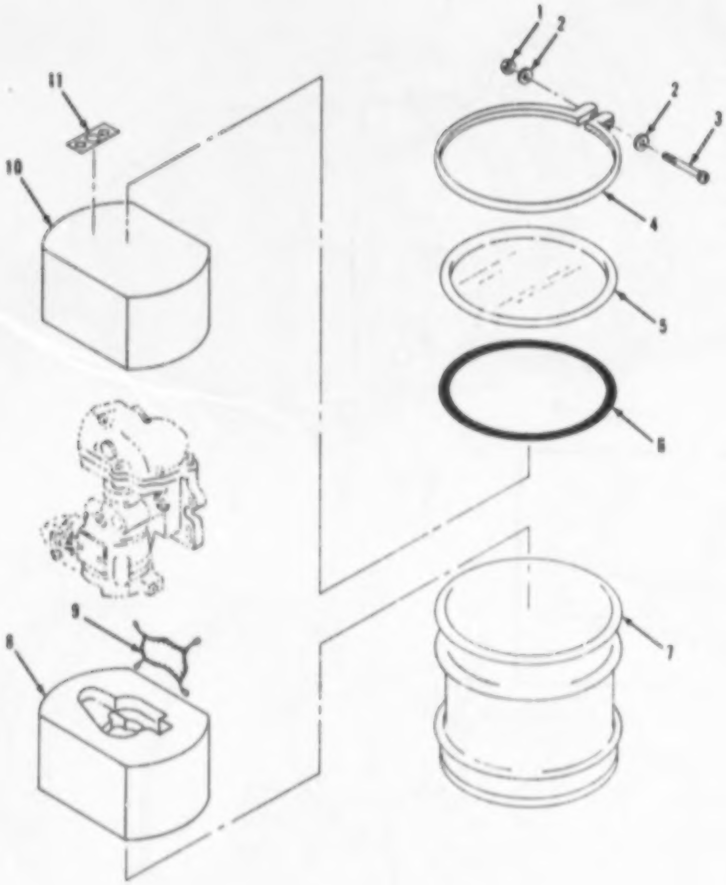
*Indicated items are not furnished with Reusable Shipping Container (FSN 8115-990-3051).

Figure 3-3. Fuel Regulator Packaging (Standard)



1. Shipping Plug (P/N 28953-2)
2. Nut (AN340-416)
3. Washer (AN960C416L)
4. Gasket (P/N 49442)
5. Shipping Cover (P/N 74252)
6. Shipping Cover (P/N 49441)
7. Screw (AN500AD416-28)
8. Shipping Plug (P/N 28901-14)

Figure 3-4. Topping Governor Protective Caps and Plugs



1. Nut (AN335-5)
2. Washer (AN960C516L)
3. Bolt (AN75A27)
4. Locking Ring (MS63050-31)
5. Cover (MS63050-21)
6. Gasket (MS63050-41)
7. Shipping Container (MS63050-22)
8. Lower Dunnage (P/N 85586-1)
*9. Desiccant (MIL-D-3464)
10. Upper Dunnage (P/N 85586-2)
*11. Humidity Indicator (MS20003-2)

*Indicated items are not furnished with Reusable Shipping Container (FSN 8115-990-3052).

Figure 3-5. Topping Governor Packaging (Standard)

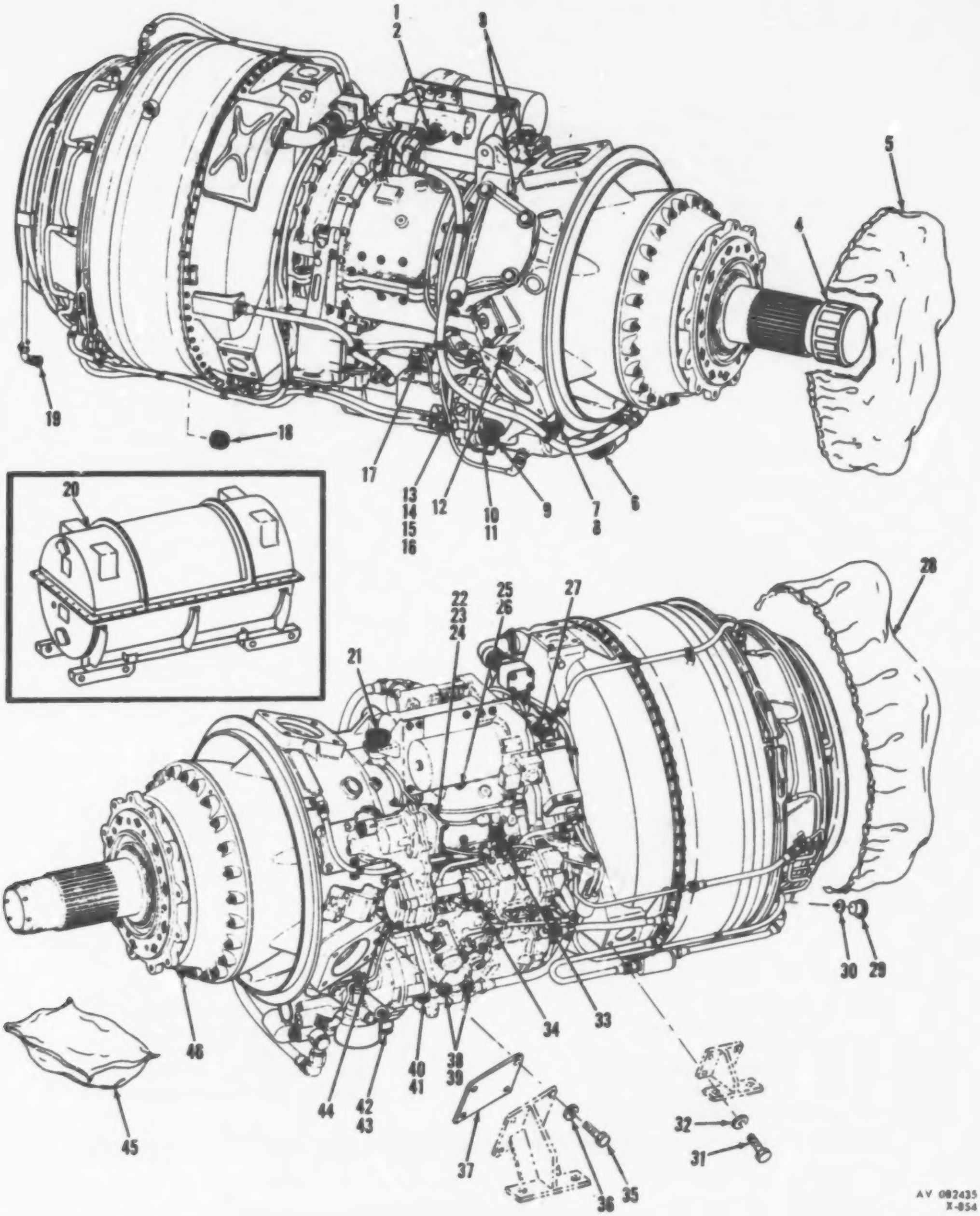

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Figure 3-6. Shipping and Packing Components (T53-L-7/7A)

Key to Figure 3-6.

1. Plug (NAS818-10)
2. Packing (MS29512-10)
3. Plug (NAS816-11)
4. Propeller Shaft Cap (AN5012-50)
5. Protective Cover (1-010-057-01)
6. Plug (NAS816-91)
7. Packing (NAS617-4)
8. Plug (NAS817-4)
9. Plug (NAS816-91)
10. Packing (NAS617-3)
11. Plug (MS9404-03)
12. Caplug (PD-40)
13. Gasket (1-080-026-01)
14. Cover (AN100041)
15. Washer (AN960-616L)
16. Nut (MS20365-624)
17. Cap (MS25177-12)
18. Cap (NAS817-4)
19. Cap (MS25177-12)
20. Shipping Container Assembly (P/N D-416B1)
21. Cap (MS25178-22)
22. Nut (MS21042-4)
23. Cover (AN1000-43)
24. Gasket (AN4045-1)
25. Plug (NAS818-10)
26. Packing (MS29512-10)
27. Cap (NAS817-4)
28. Protective Cover (1-010-021-01)
29. Sealing Cap (1/2 x 2)
30. Plug (NAS816-42)
31. Bolt (MS9534-16)
32. Washer (AN960-816)
33. Cap (MS25177-12)
34. Cap (NAS817-4)
35. Bolt (AN104012)
36. Washer (AN960-616)
37. Gasket (1-010-092-01)
38. Packing (MS29512-4)
39. Plug (MS9015-04)
40. Packing (MS29512-4)
41. Plug (NAS818-4)
42. Packing (NAS617-4)
43. Plug (NAS818-4)
44. Plug (NAS816-23)
45. Desiccant (MIL-D-3464, Type III)
46. Cap (NAS817-4)

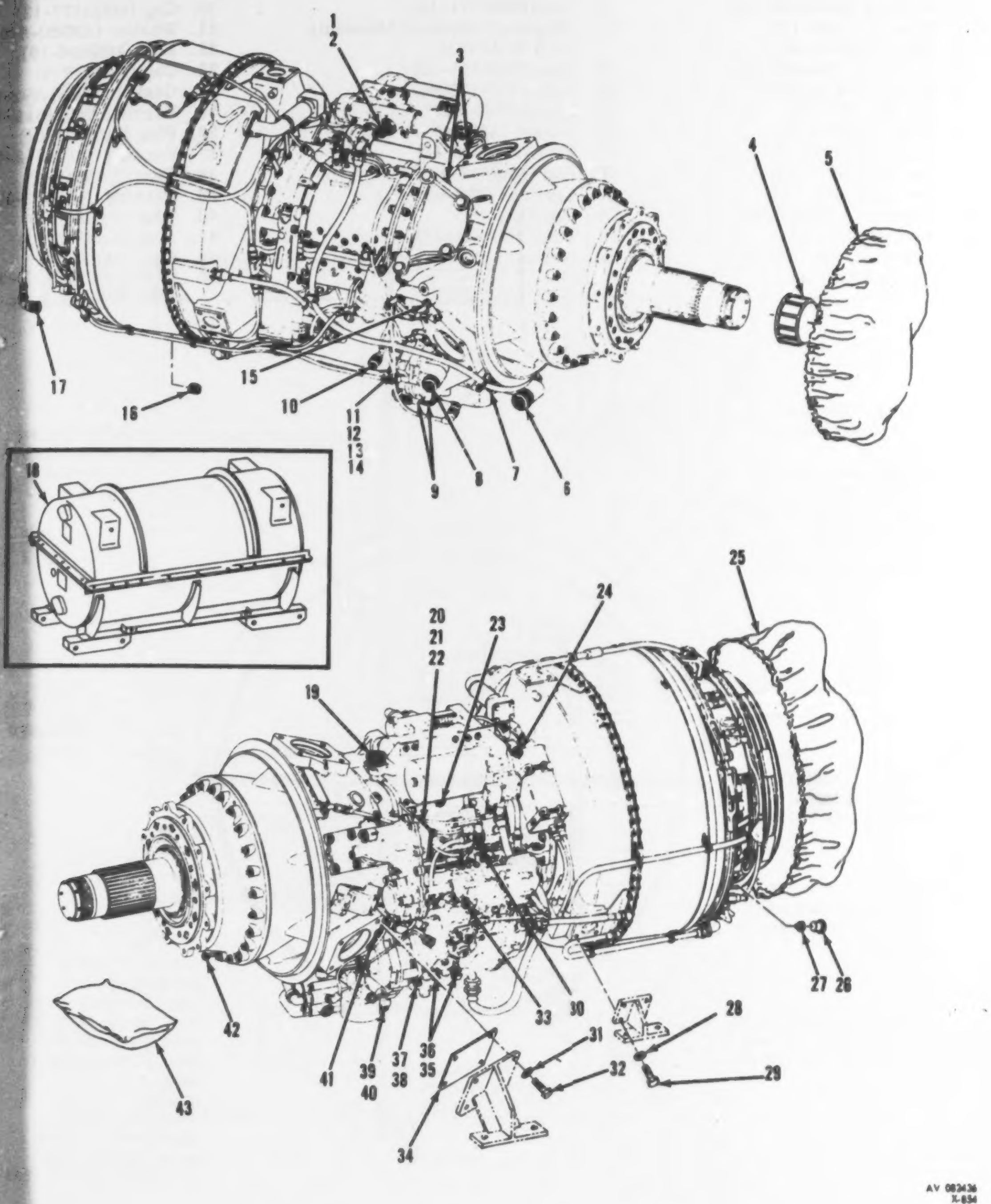
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Figure 3-7. Shipping and Packing Components (T53-L-15/701) (Typical)

Key to Figure 3-7.

1. Plug (NAS818-10)
2. Packing (MS29512-10)
3. Plug (NAS816-11)
4. Cap (AN5012-50)
5. Cover (1-010-057-01)
6. Plug (NAS816-91)
7. Cap (NAS817-4)
8. Plug (NAS816-91)
9. Plug (STD3021-03)
10. Cap (MS25177-12)
11. Nut (MS20365-624)
12. Washer (AN960-616L)
13. Cover (AN100041)
14. Gasket (1-080-026-01)
15. Cap (NAS817-4)
16. Cap (NAS817-4)
17. Cap (MS25177-12)
18. Shipping Container Assembly (P/N D-416B1)
19. Cap (MS25178-22)
20. Cover (AN100043)
21. Nut (AN363-428)
22. Gasket (AN4045-1)
23. Plug (NAS818-10)
24. Cap (NAS817-4)
25. Cover (1-010-021-01)
26. Cap (1/2 x 2)
27. Plug (NAS816-42)
28. Washer (AN960-816)
29. Bolt (AN104009)
30. Cap (MS25177-12)
31. Washer (AN960-616
32. Bolt (MS9534-16)
33. Cap (NAS817-4)
34. Gasket (1-010-092-
35. Packing (MS29512-
36. Plug (MS9015-04)
37. Packing (MS29512-
38. Plug (NAS818-4)
39. Packing (NAS617-4)
40. Plug (NAS818-4)
41. Plug (NAS816-23)
42. Cap (NAS817-4)
43. Desiccant (MIL-D-
Type III)

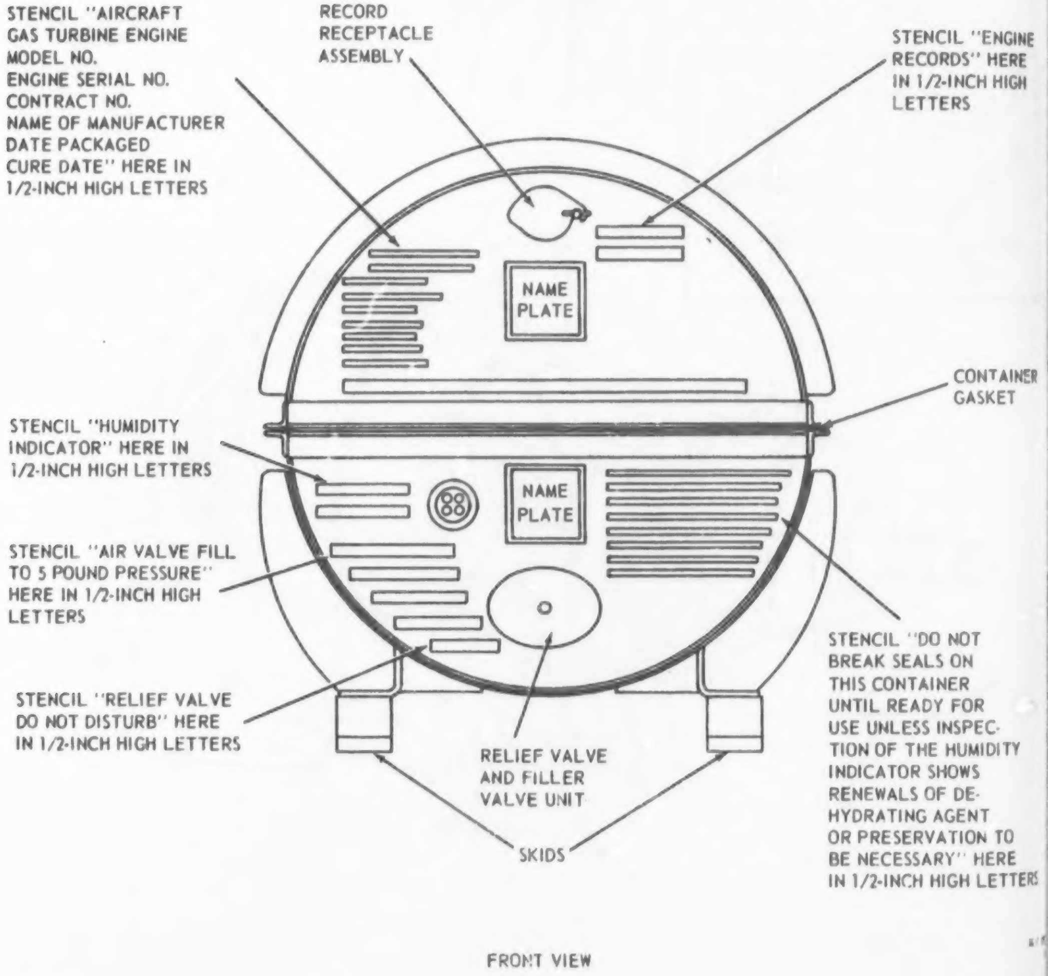
STENCIL "AIRCRAFT
GAS TURBINE ENGINE
MODEL NO.
ENGINE SERIAL NO.
CONTRACT NO.
NAME OF MANUFACTURER
DATE PACKAGED
CURE DATE" HERE IN
1/2-INCH HIGH LETTERS
RECORD RECEPTACLE ASSEMBLY
STENCIL "ENGINE RECORDS" HERE IN 1/2-INCH HIGH LETTERS
NAME PLATE
CONTAINER GASKET
STENCIL "HUMIDITY INDICATOR" HERE IN 1/2-INCH HIGH LETTERS
NAME PLATE
STENCIL "AIR VALVE FILL TO 5 POUND PRESSURE" HERE IN 1/2-INCH HIGH LETTERS
STENCIL "RELIEF VALVE DO NOT DISTURB" HERE IN 1/2-INCH HIGH LETTERS
RELIEF VALVE AND FILLER VALVE UNIT
SKIDS
STENCIL "DO NOT BREAK SEALS ON THIS CONTAINER UNTIL READY FOR USE UNLESS INSPECTION OF THE HUMIDITY INDICATOR SHOWS RENEWALS OF DEHYDRATING AGENT OR PRESERVATION TO BE NECESSARY" HERE IN 1/2-INCH HIGH LETTERS
FRONT VIEW

Figure 3-8. Marking Shipping Container (Sheet 1 of 3)

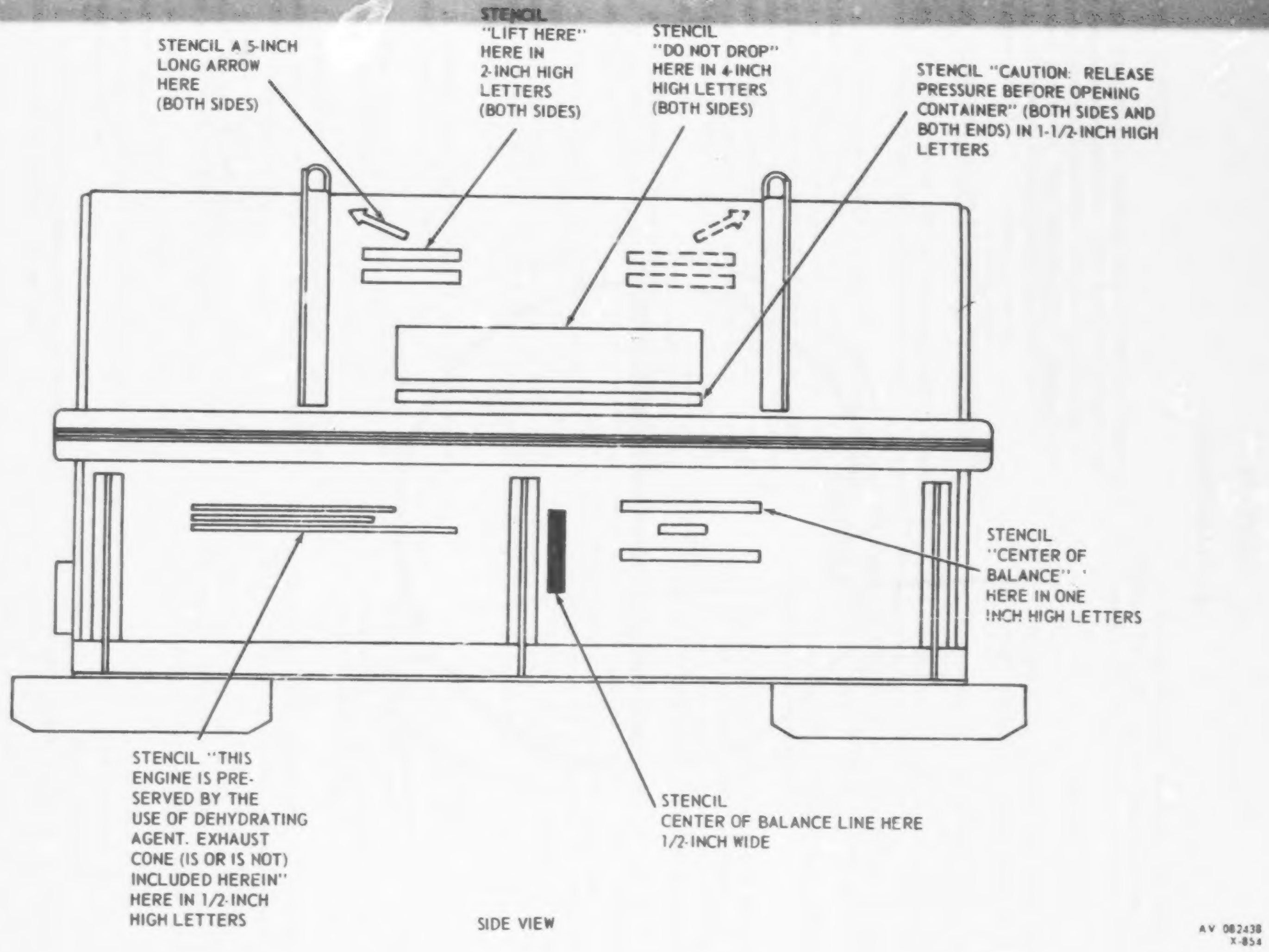
STENCIL A 5-INCH LONG ARROW HERE (BOTH SIDES)
STENCIL "LIFT HERE" HERE IN 2-INCH HIGH LETTERS (BOTH SIDES)
STENCIL "DO NOT DROP" HERE IN 4-INCH HIGH LETTERS (BOTH SIDES)
STENCIL "CAUTION: RELEASE PRESSURE BEFORE OPENING CONTAINER" (BOTH SIDES AND BOTH ENDS) IN 1-1/2-INCH HIGH LETTERS
STENCIL "CENTER OF BALANCE" HERE IN ONE INCH HIGH LETTERS
STENCIL "THIS ENGINE IS PRESERVED BY THE USE OF DEHYDRATING AGENT. EXHAUST CONE (IS OR IS NOT) INCLUDED HEREIN" HERE IN 1/2-INCH HIGH LETTERS
STENCIL CENTER OF BALANCE LINE HERE 1/2-INCH WIDE
SIDE VIEW
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Figure 3-8. Marking Shipping Container (Sheet 2 of 3)

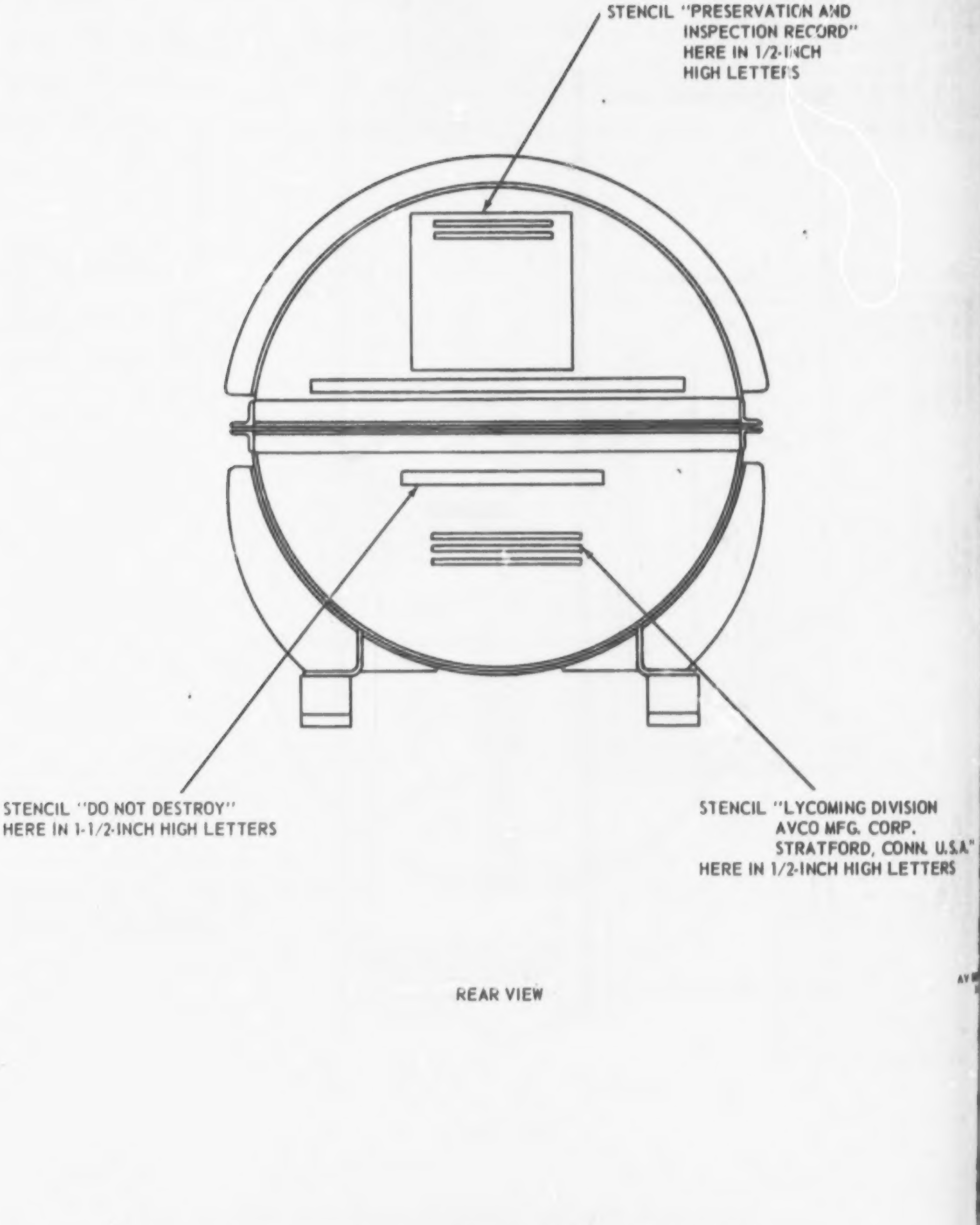

STENCIL "PRESERVATION AND
INSPECTION RECORD"
HERE IN 1/2-INCH
HIGH LETTERS
STENCIL "DO NOT DESTROY"
HERE IN 1-1/2-INCH HIGH LETTERS
STENCIL "LYCOMING DIVISION
AVCO MFG. CORP.
STRATFORD, CONN. U.S.A."
HERE IN 1/2-INCH HIGH LETTERS
REAR VIEW

Figure 3-8. Marking Shipping Container (Sheet 3 of 3)

SECTION II

ENGINE HANDLING

3-28. GENERAL.

3-29. This section contains instructions for removal of engine subassemblies. Also included are general precautionary information, certain standard maintenance practices. Instructions for cleaning, inspection, and repair of subassemblies are given in Chapters 5 and 7.

3-30. GENERAL MAINTENANCE PROCEDURES.

3-31. PRECAUTIONS. When removing engine components, observe the following precautions:

a. Use extreme caution to prevent dirt and foreign objects from entering engine. Place temporary covers on all exposed openings. All open hoses and tubing shall be protected with plastic or metal caps. If suitable caps are not available, use commercial grade aluminum foil crimped to fit the particular opening. Do not use tape to seal fuel or oil openings. Tape adhesive is soluble in fuel or oil and can cause contamination.

b. Protect engine from dust and inclement weather. If practical, perform engine maintenance in closed areas.

c. Apply penetrating oil (item 84, table 2-2) as required to assist in removal of parts during disassembly. On parts to be reinstalled, remove all traces of penetrating oil with drycleaning solvent (item 28, table 2-2).

d. Before removing engine electrical components, ensure electrical power is off.

e. When removing lockwire, use care to prevent damage to lockwire holes.

f. Discard used lockwire, packings, cotter pins, gaskets, tabwashers, lockpins, keywashers, and lockwashers.

g. When removing hoses and electrical lines, remove clamps from brackets. Generally, brackets are left on engine unless otherwise stated.

h. When disconnecting electrical connectors, or hose and tube fittings, remove clamps or brackets as required to gain slack and avoid damage to connectors and fittings.

i. Remove hose assemblies that may be damaged during removal of engine components.

j. Avoid hanging objects (tools, etc.) on hose assemblies.

k. Care shall be taken to route and clamp hose assemblies securely. Chafing shall be avoided at all times. Proper clamping and chafing pads shall be used at all times.

l. During removal, examine all parts for serviceability. Tag all removed leads, hoses, and linkages by location, so they may be correctly reinstalled.

NOTE

Fittings being tightened to prescribed torques should have dry, clean threads.

m. When removing or installing oil, fuel, and air hose assemblies (see figure 3-9) do not apply torque to narrow hex nut or sleeve and nipple. Torque must be applied only to wide hex nut. When loosening or tightening the wide hex nut, secure the nipple or sleeve to prevent twisting of hose assembly.

n. Remove protective tape, caps, plugs and covers as necessary for installation.

o. All repairable components without specific shipping instructions shall be adequately preserved and returned for repair using sufficient packing material to avoid additional damage during transit.

3-32. MARKING MATERIALS SUBJECT TO HIGH TEMPERATURES. Marking on materials subject to high temperatures shall be done only with one of the following: yellow marking pencil (item 125, table 2-2), marking ink (item 71, table 2-2), Marks-A-Lot ink pencil (item 73, table 2-2), or Opco Marker (blue, green, or black) (item 82, table 2-2).

CAUTION

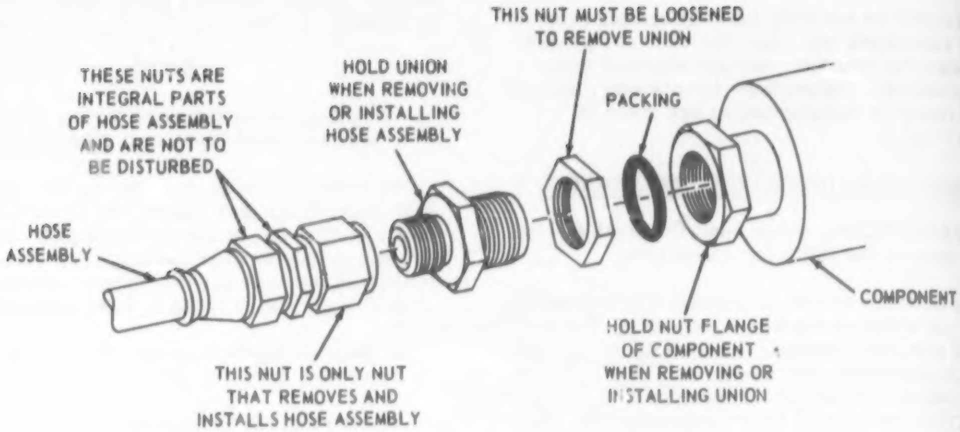
The use of nonapproved marking materials such as common lead pencils on materials subjected to high temperatures may cause engine contamination or cracking of detail parts.

3-33. CHANGING FROM MIL-L-7808 TO MIL-L-23699 LUBRICATING OIL. Perform the following:

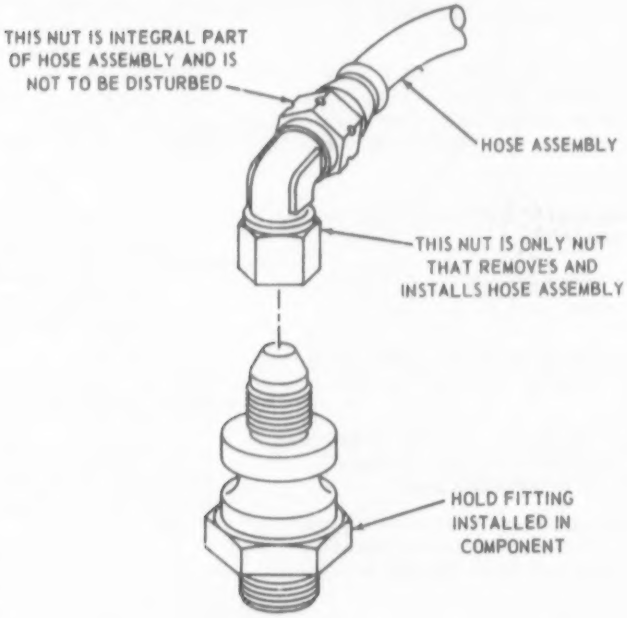
a. Drain lubricating oil (item 64, table 2-2) from the engine oil system. Inspect and clean all oil filters and strainers. (Refer to paragraphs 5-109, 5-95, and 5-100.)

WARNING

Prolonged contact with lubricating oil (item 63 or 64, table 2-2) may cause a skin rash. These areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Saturated clothing should be removed immediately. Areas in which lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.


THIS NUT MUST BE LOOSENED TO REMOVE UNION
THESE NUTS ARE INTEGRAL PARTS OF HOSE ASSEMBLY AND ARE NOT TO BE DISTURBED
HOLD UNION WHEN REMOVING OR INSTALLING HOSE ASSEMBLY
PACKING
HOSE ASSEMBLY
COMPONENT
HOLD NUT FLANGE OF COMPONENT WHEN REMOVING OR INSTALLING UNION
THIS NUT IS ONLY NUT THAT REMOVES AND INSTALLS HOSE ASSEMBLY

WHEN FITTING IS NOT AN INTEGRAL PART OF HOSE ASSEMBLY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HOSE ASSEMBLY
THIS NUT IS ONLY NUT THAT REMOVES AND INSTALLS HOSE ASSEMBLY
HOLD FITTING INSTALLED IN COMPONENT

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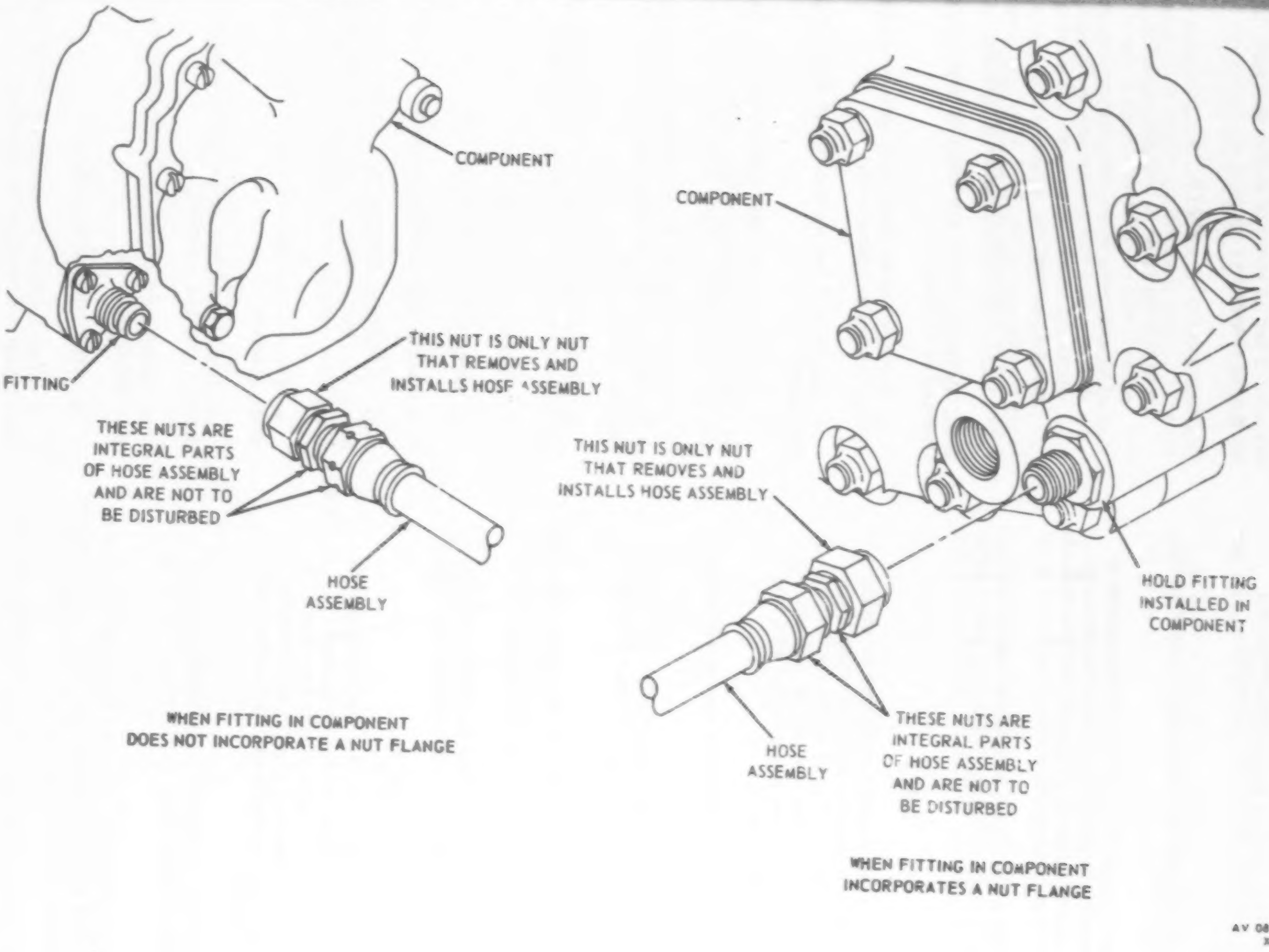
Figure 3-9. Proper Removal/Installation of Hose Assemblies (Sheet 1 of 2)


COMPONENT
FITTING
THIS NUT IS ONLY NUT THAT REMOVES AND INSTALLS HOSE ASSEMBLY
THESE NUTS ARE INTEGRAL PARTS OF HOSE ASSEMBLY AND ARE NOT TO BE DISTURBED
HOSE ASSEMBLY
COMPONENT
THIS NUT IS ONLY NUT THAT REMOVES AND INSTALLS HOSE ASSEMBLY
HOLD FITTING INSTALLED IN COMPONENT
HOSE ASSEMBLY
THESE NUTS ARE INTEGRAL PARTS OF HOSE ASSEMBLY AND ARE NOT TO BE DISTURBED
AV 082441
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WHEN FITTING IN COMPONENT DOES NOT INCORPORATE A NUT FLANGE

WHEN FITTING IN COMPONENT INCORPORATES A NUT FLANGE

Figure 3-9. Proper Removal/Installation of Hose Assemblies (Sheet 2 of 2)

CAUTION

> Lubricating oil (item 63 or 64, table 2-2) may soften paint upon contact. If lubricating oil is spilled on painted surfaces, these surfaces should be thoroughly washed.

b. Fill the engine oil system with lubricating oil (item 63, table 2-2).

c. Operate engine for a period of 30 minutes to one hour to heat the oil to operating temperature which will promote the dislodging of residual MIL-L-7808 carbon and lacquer deposits.

d. Shut down the engine and inspect and clean engine oil filters and strainers. (Refer to paragraphs 5-69 and 5-72.)

NOTE

> If heavy contamination of filters or strainers is noted, proceed with following steps e. through g. If little or no contamination of filters or strainers is noted, release aircraft for service and proceed with following steps f. and g.

e. Drain lubricating oil from engine oil system and discard.

f. Refill the engine oil system with new lubricating oil (item 63, table 2-2) and release aircraft for service.

g. Inspection and cleaning of the engine oil filters and strainers is required after 5 and 15 hours of engine operation following the oil changeover.

h. After 15 hour inspection of engine oil filters and strainers, revert to normal inspection interval.

NOTE

> It is not advisable to mix MIL-L-23699 oil with MIL-L-7808 oil except in cases of emergency. If this becomes necessary, it is required that the system be flushed within six hours as outlined in preceding steps a through f.

3-34. CHANGING FROM MIL-L-23699 to MIL-L-7808 LUBRICATING OIL. Perform the following procedures:

a. Drain lubricating oil (item 63, table 2-2) from the engine oil system. Inspect and clean all oil filters and strainers. (Refer to paragraphs 5-69 and 5-72.)

b. Fill engine oil system with lubricating oil (item 64, table 2-2).

c. Operate engine until oil reaches operating temperature.

d. Shut down engine and inspect and clean
oil filters and strainers. (Refer to paragraph
and 5-72.) Release aircraft for service.

e. Inspect and clean engine oil filters and
ers after 5 and 15 hours of engine operation
ing the oil changeover.

NOTE

> It is not advisable to mix MIL-L-23699
> oil with MIL-L-7808 oil except in cases
> of emergency. If this becomes necessar
> it is required that the system be flushed
> within six hours, as outlined in preceding
> steps a. through e.

3-35. PREPARATION FOR DISMANTLING.

3-36. INSTALLATION OF ENGINE INTO STA
Proceed as follows:

a. Prepare engine stand with appropriate
ware as shown in figure 3-10.

b. Adjust hoist as necessary and guide
into stand.

c. Loosen nuts or bolts that secure the
the ring of the stand and slide clamps toward
side diameter of the plate. Secure the clamp

d. Guide front end of the engine into the
of the plate so that the inlet housing flange is
against rear of plate.

e. Position clamps over the inlet housing
and tighten to secure the engine to the plate.

f. Remove lifting sling.

g. Drain all residual engine oil.

h. Install inlet housing protector (LTCT

3-37. DRAINING ENGINE OIL. There are
servicing instructions necessary for engine
other than ensuring that the oil level is suffic

a. Place a suitable container under the
drive gearbox.

b. Remove magnetic chip detector drain
accessory drive gearbox.

c. Disconnect scavenge oil hose from the
sory drive gearbox.

d. Drain lubricating system.

e. After draining is completed, replace
nect items removed or disconnected.

3-38. REMOVAL OF ENGINE ACCESSORIES

Table 3-2. (Deleted)

. Instruction for removal of accessories are ded in Chapter 5 of this manual. Observe pre- ons given in paragraph 3-31.

. REMOVAL OF ENGINE SUBASSEMBLIES.

. REMOVAL OF OVERSPEED GOVERNOR AND HOMETER DRIVE ASSEMBLY (T53-L-7/7A/15 nes). (See figure 3-11.) Proceed as follows:

Remove power-driven rotary (booster) pump. r to paragraph 5-112.)

Using 8-32 threaded rod, pull topping governor shaft (2, figure 5-29) through overspeed gover- nd tachometer drive housing.

NOTE

Splined nuts (shims) removed in following step c. may or may not be installed.

c. Remove splined nuts (shims) (1) if installed and tag according to their respective positions.

d. Expand and slide retaining ring (4) to center of shaft tube (5). Slide shaft tube aft into topping governor housing.

e. Remove bolts (2, 4, and 6, figure 3-11) and washers (1, 5, and 7) and bracket (11) that secure overspeed governor and tachometer drive assembly (3) to mounting pad on inlet housing.

f. Remove overspeed governor and tachometer drive assembly, discard packings (9 and 10), and withdraw shaft (8) from inlet housing.

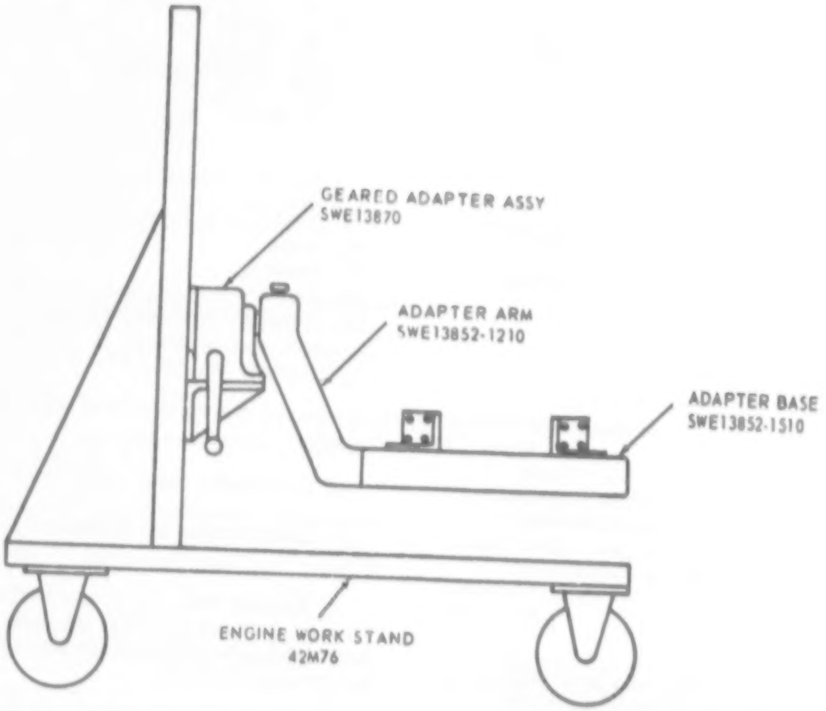
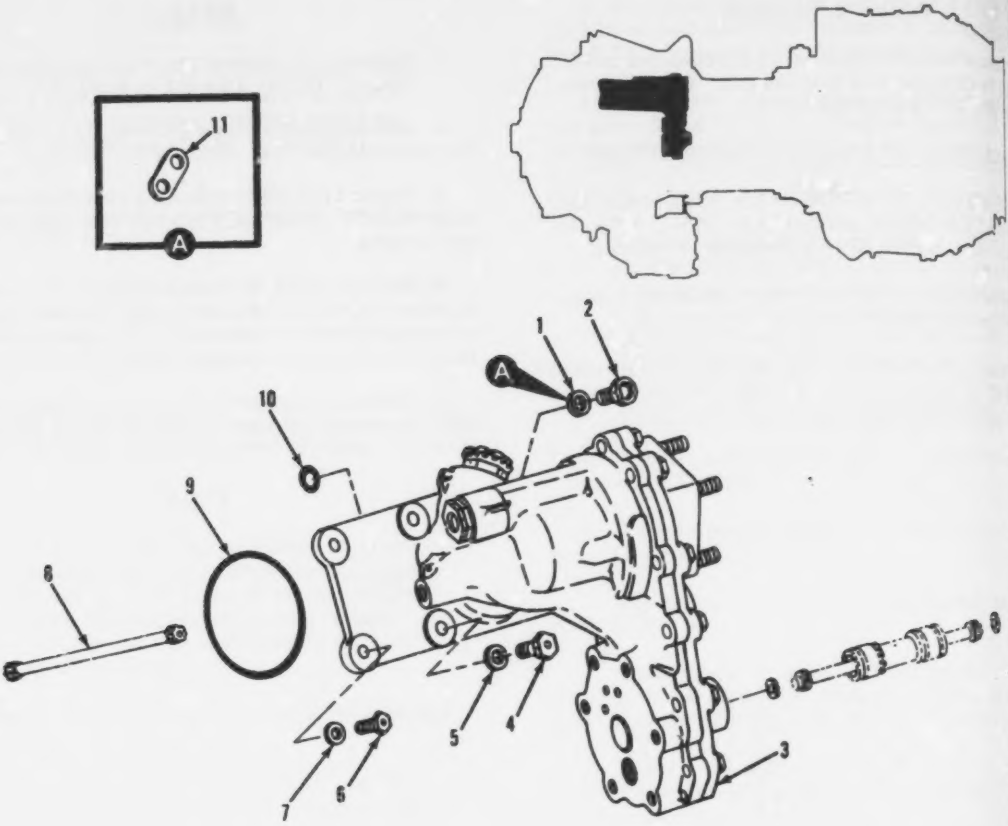

GEARED ADAPTER ASSY
SWE13870
ADAPTER ARM
SWE13852-1210
ADAPTER BASE
SWE13852-1510
ENGINE WORK STAND
42M76
AV 081136
XA-854

Figure 3-10. Engine Maintenance Stand (Typical)



1. Washer (T53-L-7/7A engines)
2. Bolt
3. Overspeed Governor and Tachometer Drive Assembly
4. Bolt
5. Washer
6. Bolt
7. Washer
8. Shaft
9. Packing
10. Packing
11. Bracket (T53-L-15 engine)

Figure 3-11. Overspeed Governor and Tachometer Drive Assembly and Attaching Parts (T53-L-7/7A/15)

3-42. REMOVAL OF TOPPING GOVERNOR AND OVERSPEED GOVERNOR AND TACHOMETER DRIVE ASSEMBLY (T53-L-701 Engine). (See figures 3-12, 3-13, and 5-29.) Proceed as follows:

CAUTION

The topping governor and overspeed governor and tachometer drive assembly must be removed as a unit.

a. Remove electric torquemeter junction box assembly (Refer to paragraph 5-127).

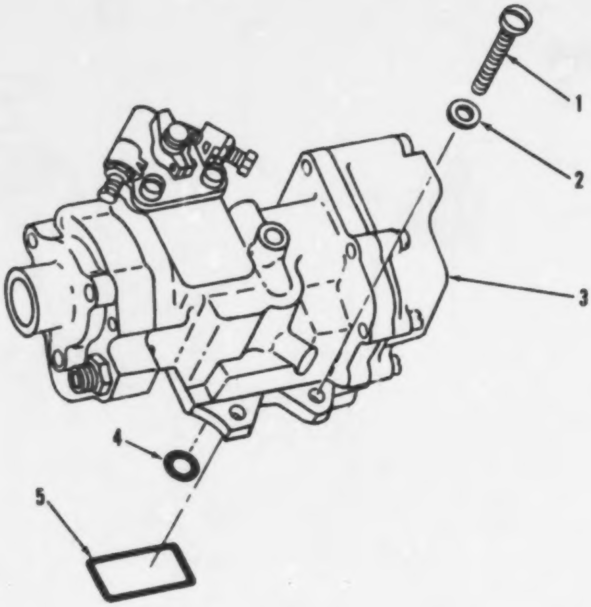
b. Disconnect connecting rod (19, figure 5-29) from engine topping governor upper lever (11).

c. Disconnect vapor return vent hose (7).

d. Remove screws (1, figure 3-12) and wa (2).

e. Remove bolts (2, 4, and 6, figure 3-13), (1), and washers (5 and 7) that secure overspe ernor and tachometer drive assembly (3) to m pad on inlet housing.

f. Manually rotate fuel regulator condition arm counterclockwise against zero degree ST position and hold.



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1. Screw 2. Washer 3. Topping Governor 4. Packing 5. Seal

Figure 3-12. Removal of Engine Topping Governor (T53-L-701)

CAUTION

The topping governor removed in following step g. must be kept as level as possible while it is removed to prevent damage to splines of dump valve.

g. Carefully raise topping governor and overspeed ernor tachometer drive assembly together, 1/4 ch. Check to ensure that condition lever shaftgear topping governor will clear splined shaft (dump ve) in fuel control.

h. Lift topping governor and overspeed governor ometer drive assembly free.

Carefully separate topping governor from over- d governor and tachometer drive assembly and ove tube (5, figure 5-29) and topping governor e shaft (2).

Remove splined nuts (1) if any, from ends of ing governor drive shaft and record number of

Withdraw shaft (9, figure 3-13) from inlet hous-

Remove packings (3, figure 5-29) from tube (5). ove packing (4, figure 3-12) from governor stand- Remove seal (5) from annular cavity in gover- Remove packings (8 and 10, figure 3-13) from speed governor and tachometer drive assembly. rd all packings.

3-43. REMOVAL OF ACCESSORY DRIVE GEARBOX ASSEMBLY. (See figure 3-14.) If accessory drive gearbox assembly is to be replaced, retain the power-driven rotary (oil) pump, oil filter, screen and oil strainer assembly (14), and chip detector. Remove and retain support, support gaskets, and mounting nuts, bolts, and washers for installation.

a. Disconnect electrical wiring at chip detector.

b. Disconnect and remove inlet guide vane actuator seal drain hose assembly from accessory drive gearbox assembly.

c. Remove power-driven rotary (oil) pump from accessory drive gearbox assembly. (Refer to paragraph 5-104.)

d. Remove fuel regulator and topping governor assembly. (Refer to paragraphs 5-74, 5-76, 5-79, and 5-82.)

e. Remove starter generator and N1 tachometer generator, if installed.

f. Remove bolts (5, figure 3-14) and washers (4) that secure gearbox support to rear flange of inlet housing assembly.

g. Support accessory drive gearbox assembly (6), and remove shouldered bolt (8), bolt (9), two bolts (11) (one not illustrated), and washers (7, 10, and 12).

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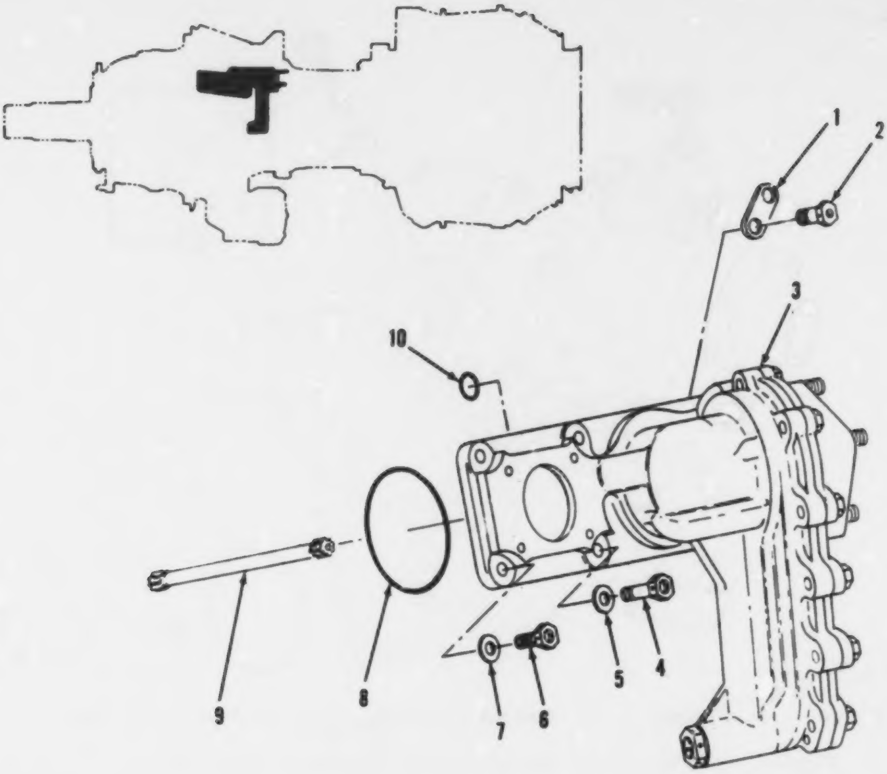


1. Bracket
2. Bolt
3. Overspeed Governor and Tachometer Drive Assembly
4. Bolt
5. Washer
6. Bolt
7. Washer
8. Packing
9. Shaft
10. Packing

Figure 3-13. Overspeed Governor and Tachometer Drive Assembly and Attaching Parts (T53-L-701)

h. Remove accessory drive gearbox assembly (6) and accessory drive shaft (1) from inlet housing.

i. Remove packings (2 and 3) from mounting face of gearbox.

j. Remove accessory drive shaft (1), packing (13 and 15), and oil strainer assembly (14) from top of accessory drive gearbox.

3-44. REMOVAL OF COMBUSTOR TURBINE ASSEMBLY (T53-L-7/7A Engines). (See figure 3-15.) Proceed as follows:

NOTE

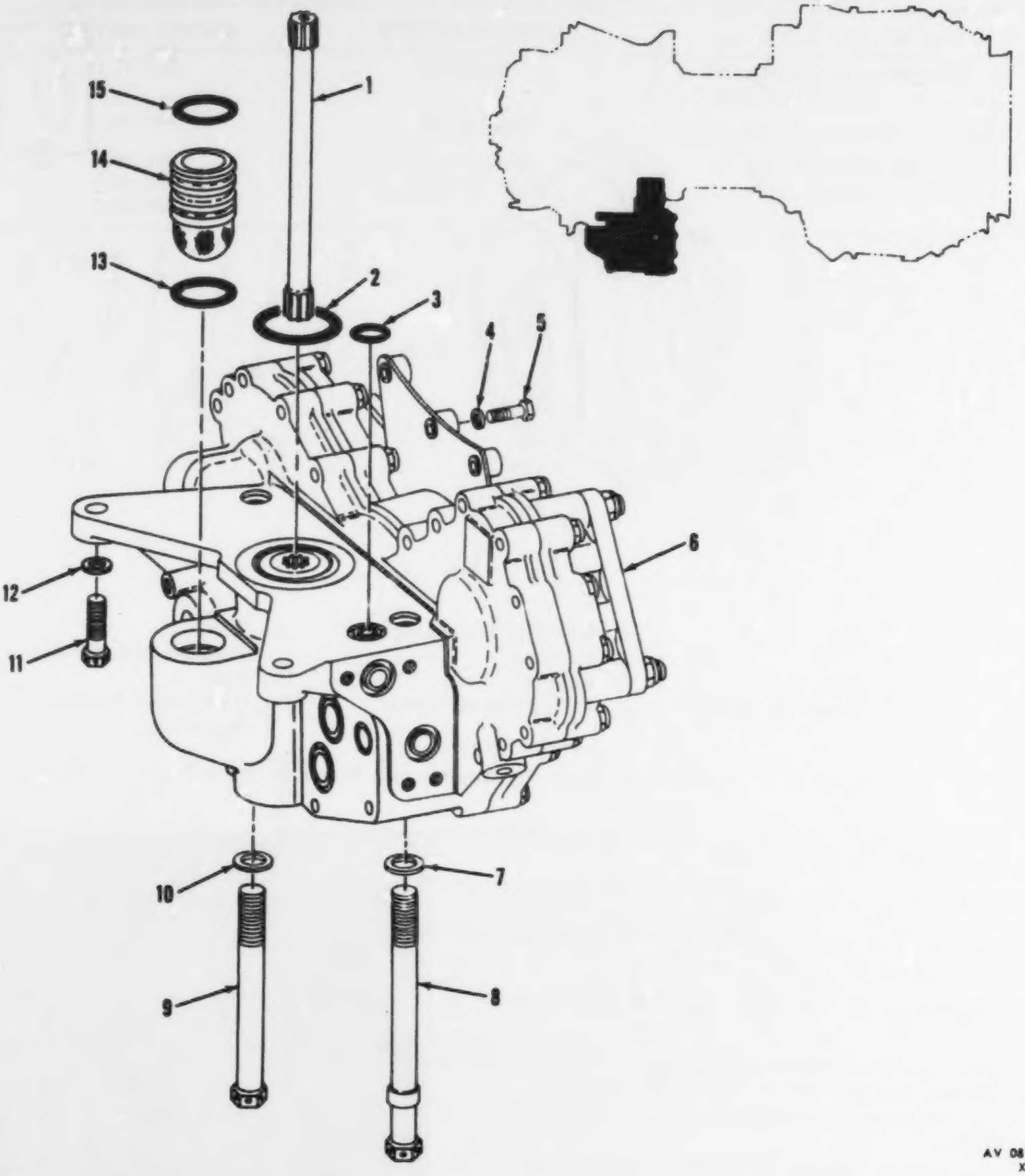
Engine must be removed from aircraft before combustor turbine assembly can be removed.

CAUTION

When disconnecting fuel lines, use extre care to prevent scoring at sealing surfac of connector. Do not disconnect hose fro aft end of filter. Secure filter to bracket with short lengths of lockwire. Identify a mark all bolts at which brackets and filte are secured.

a. Disconnect ignition leads at igniter plugs. connect main fuel hose from front of bypass fu Cap hoses and filter, and secure filter and atta hose to combustor housing.

b. Remove bolts (11, figure 3-15) and exhau fuser cover (10).


1
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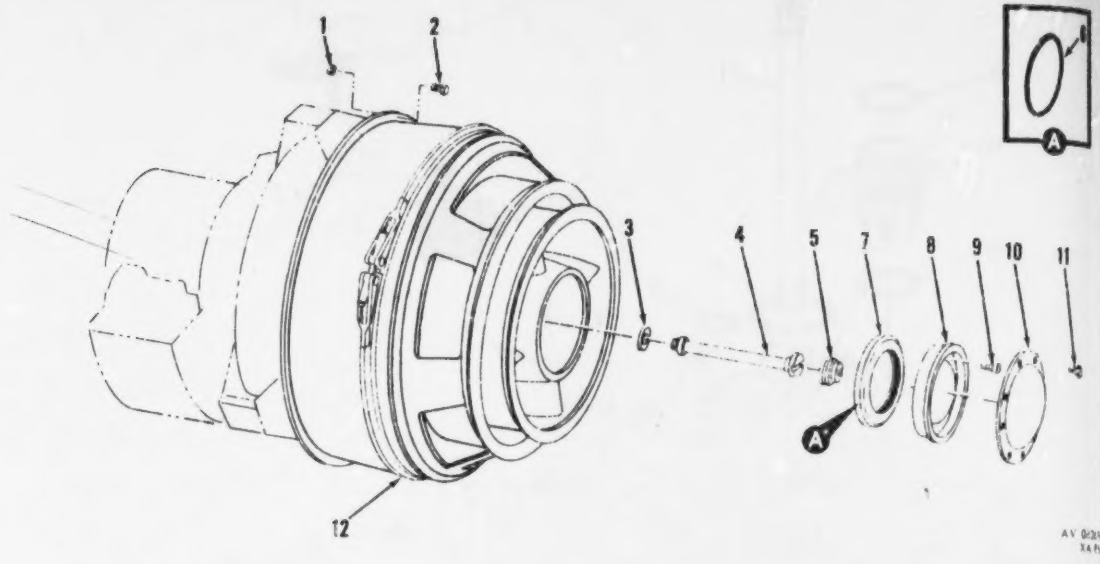
1. Accessory Drive Shaft	6. Accessory Drive Gearbox Assembly	11. Bolt
2. Packing	7. Washer	12. Washer
3. Packing	8. Shouldered Bolt	13. Packing
4. Washer	9. Bolt	14. Oil Strainer Assembly
5. Bolt	10. Washer	15. Packing

Figure 3-14. Accessory Drive Gearbox Assembly and Attaching Parts



1. Nut
2. Bolt
3. Shim
4. Power Shaft Bolt
5. Internal Wrenching Nut
6. Packing
7. Seal
8. Rear Bearing Cover
9. Bolt
10. Exhaust Diffuser Cover
11. Bolt
12. Combustor Turbine Assembly

Figure 3-15. Combustor Turbine Assembly and Attaching Parts (T53-L-7/7A)

c. Remove bolts (9) that secure rear bearing cover (8) to exhaust diffuser housing.

d. Install three puller screws in cover at approximately 1-, 4-, and 9-o'clock positions. Tighten puller screws evenly and remove rear bearing cover (8) and seal (7) or packing (6). Seal (7) is reusable.

e. Straighten deformed rim of internal wrenching nut (5) at four places.

f. Position locking plate (LTCT248) against exhaust diffuser housing with tangs of plate engaging power turbine bearing retainer nut. Secure plate with three bolts.

g. Using socket wrench (LTCT505), remove and retain internal wrenching nut for re-use. (See figure 3-16.)

NOTE

When removing shims in following step h., record shim thickness and attach shims, nut, and bolt to air diffuser.

h. Using socket wrench (LTCT506), remove power shaft bolt (4, figure 3-15) and shims (3).

i. (Deleted)

j. (Deleted)

k. Select the approximate lifting device from table 3-3, depending on the position of the engine (horizontal or vertical). (See figure 3-17.)

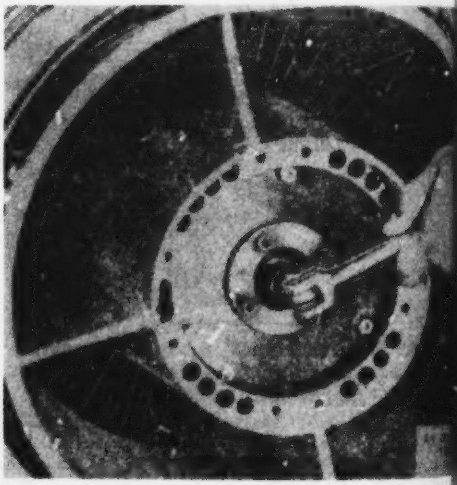


Figure 3-16. Removing Power Shaft Inte
Wrenching Nut (T53-L-7/7A)

1. Secure the lifting device to a suitable
and to the combustor turbine as outlined in
3-3.

1A. Mark relationship of combustor turbi
diffuser using approved marker.

Table 3-3. Combustor Turbine Assembly Lifting Devices and Applications

LIFTING DEVICE	ENGINE ATTITUDE	LOCATION OF DEVICE
LTCT53	Vertical	Exhaust Diffuser Support Cone Aft Flange
LTCT87	Horizontal	Around Combustor Housing
LTCT91 LTCT2089 LTCT3665	Horizontal or Vertical	Exhaust Diffuser Support Cone Aft Flange

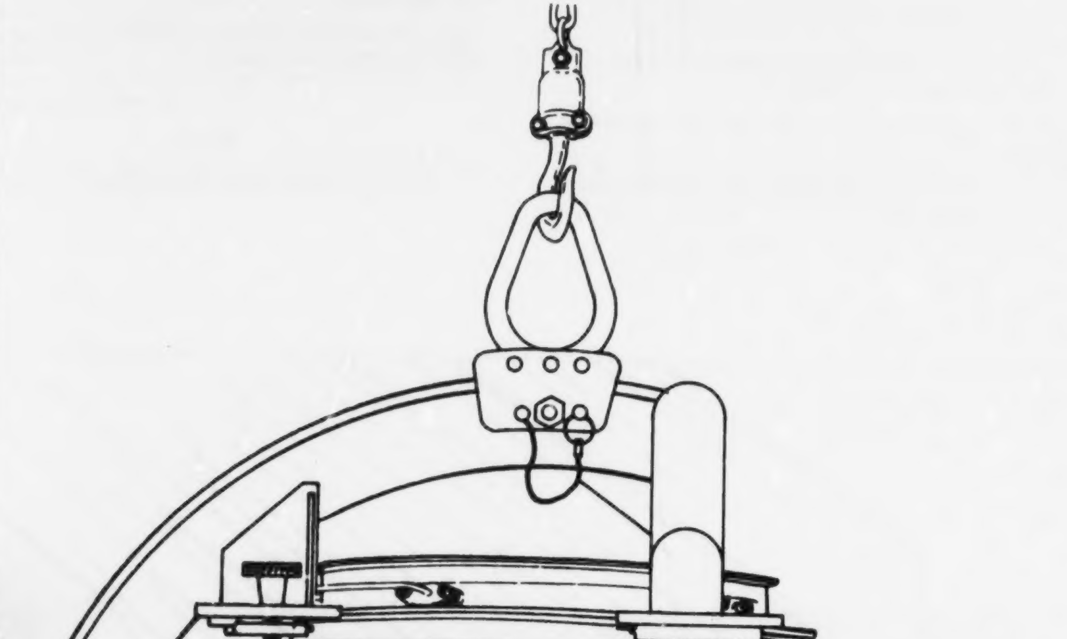


Figure 3-17. Lifting Combustor Turbine Assembly With Adapter (Typical)

m. Using wrench (LTCT393), remove bolts (2, figure 3-15 and nuts (1) that secure combustor turbine assembly (12) to diffuser housing.

mA. Remove combustor turbine sufficiently to mark relationship of power shaft to power turbine shaft using approved marker.

NOTE

Marking is required for proper reinstallation of same combustor turbine. Do not rotate engine, combustor turbine assembly, or power turbine until marking is accomplished.

n. Lift combustor turbine assembly and place on suitable work surface.

o. Perform power shaft bolt flange depth measurement. (Refer to paragraph 3-45.)

3-44A. COMBUSTOR TURBINE ASSEMBLY P SHAFT MATING SPLINES INSPECTION (T53-L-13B/703 Engines). Visually inspect the pow (drive and driven) splines for wear. If wear or fretti evident as shown in Figure 3-17A the following wil

a. Light to medium (condition A and B) are accep

b. Heavy wear (condition C) is acceptable up to t depth stepped wear on external (driven) splines, pr heavy metallic build-up on mating power turbine (d ternal splines is cleaned with a stiff wire brush and cleaning solvent.

c. Inspect internal splines (drive) for wear. Wear 0.005 inch depth is acceptable.

NOTE

Do not lubricate power shaft splines.

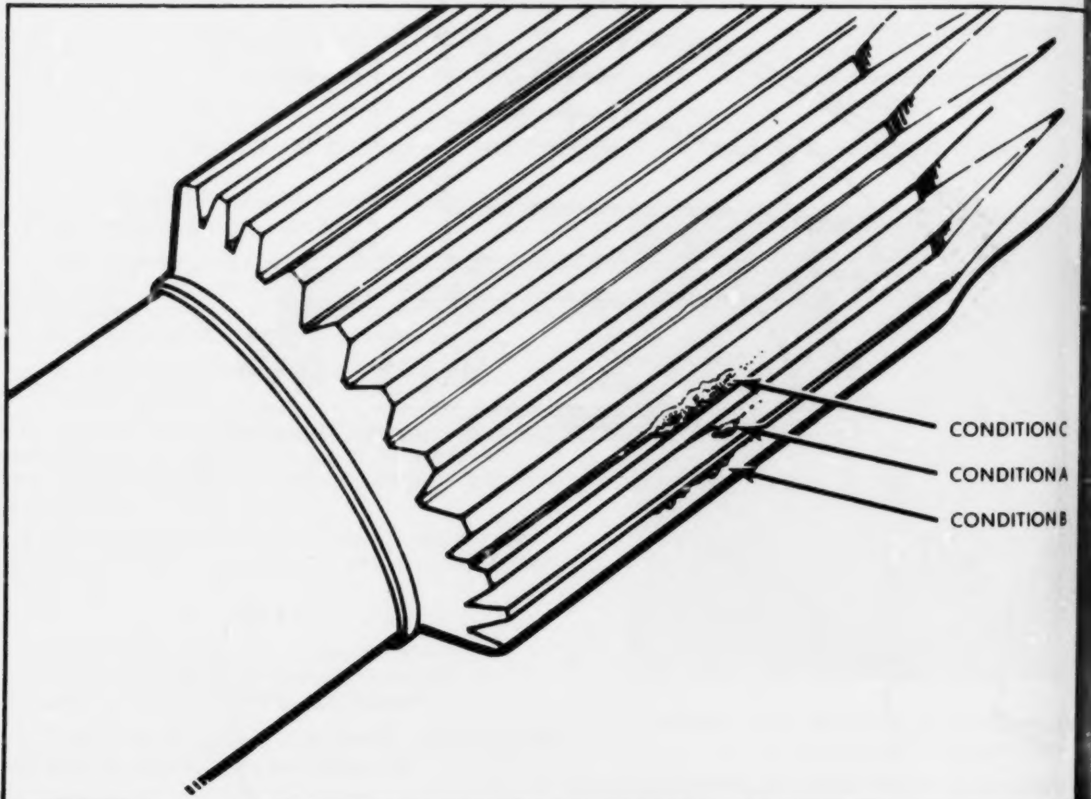


Figure 3-17A. Inspecting Power Shaft Splines.
(T53-L-13B/703 Engines)

POWER SHAFT BOLT FLANGE DEPTH MEAS-
MENT (T53-L-7/7A Engines). The original power
bolt flange depth must be recorded for reference dur-
eassembly if the power turbine support assembly or
xhaust diffuser is disassembled or replaced. The flange
measurement governs the thickness of shims (3, fig-
-15) to be placed under the head of the power shaft
4) to correctly position the power shaft with the com-
o: rotor assembly.

With combustor turbine assembly on bench, install
al shims (3), bolt (4), and internal wrenching nut (5).
en nut snugly, using socket wrench (LTCT505). Re-
three bolts and locking plate (LTCT248). Position ex-
diffuser down; place locating button bar (LTCT153)
mbustor flange and alignment tool (LTCT503) in pow-
bine spline. (See figure 3-18.)

With vernier depth gage, measure from top of bar to
f alignment tool (dimension A).

c. With vernier depth gage, measure from top of bar to combustor flange (dimension B).

d. Subtract dimension B from dimension A. Resulting dimension, plus length of the alignment tool (dimension C), will be flange depth. Record and retain this measurement for reference during assembly.

e. Install locking plate assembly (LTCT248) and remove internal wrenching nut (5, figure 3-15), power shaft bolt (4), and shims (3). Record number and thickness of shims, and secure shims to bolt with wire.

f. Remove locking plate assembly (LTCT248).

3-46. CHECKING POWER TURBINE BLADE TIP CLEARANCE (T53-L-7/7A Engines). Proceed as follows:

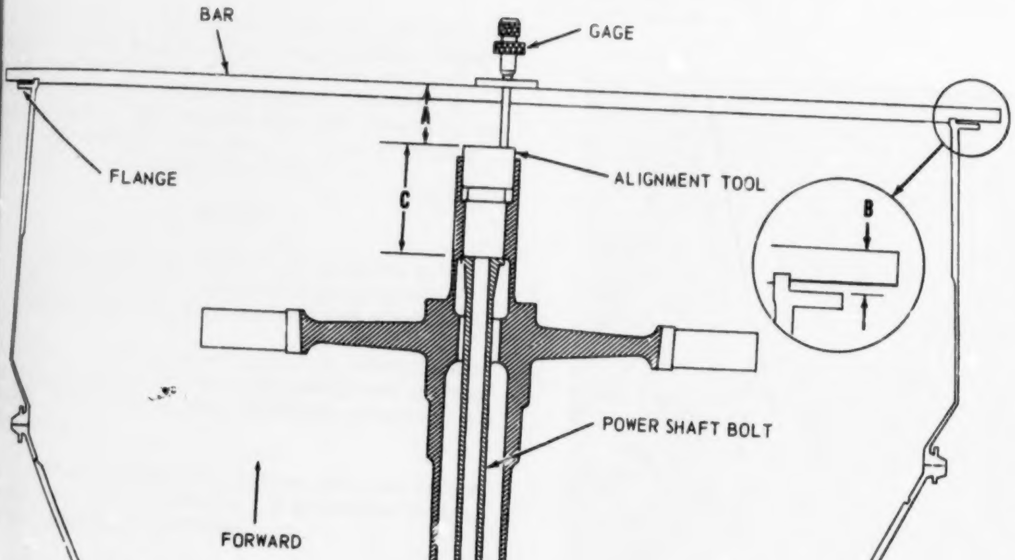


Figure 3-18. Measuring Power Shaft Bolt Flange Depth (T53-L-7/7A)

a. Insert feeler gage (1/4 inch wide) between power turbine cylinder and tip of longest power turbine blade.

b. Rotate turbine wheel one full revolution at each position, and measure minimum blade tip clearance at eight points 45 degrees apart.

NOTE

Blade tip clearance is affected by No. 3 bearing wear.

c. Clearance at all points shall be as given in table 11-4, reference number 55. If clearance is below limit at one or more points, check for blade growth or cylinder warpage.

d. Check for blade growth as follows:

e. Insert feeler gage (1/4 inch wide) between turbine rotor blade tips and power turbine cylinder at one location. Ensure that feeler gage is equal to gap at that point.

f. Without moving feeler gage, carefully rotate turbine rotor one complete revolution. If dimension varies (turbine rotor binds or gap becomes wider), local blade growth is indicated. Mark long blades with approved marking pencil. (Refer to paragraph 3-3.)

g. Remove power turbine nozzle and cylinder if blade growth is indicated.

h. Using 13- to 14-inch micrometer, measure OD of turbine rotor at minimum of eight points. Make certain that measurements are made at areas of growth as noted in preceding step b. Record the measurements. The outside diameter should not exceed 13.161 inches maximum, nor vary more than 0.00 inch from minimum to maximum.

NOTE

If no local blade growth was indicated in preceding step f., use any blade as a reference when performing following step i.

i. If blade growth is not indicated, insert feeler gage between tip of longest blade and power turbine cylinder. Ensure that gage thickness is equal to gap at that point.

j. Carefully rotate both turbine rotor and feeler gage one complete revolution. If dimension varies, cylinder warpage is indicated.

k. Repair cylinder warpage as outlined in paragraph 7-159.

3-4. CHECKING FIRST STAGE TURBINE BLADE TIP CLEARANCE (T53-L-7/7A Engines). Proceed as follows:

a. Remove combustor turbine assembly. (Refer to paragraph 3-44.)

b. Check blade tip clearance at eight positions, 45 degrees apart. (See figure 3-19.)

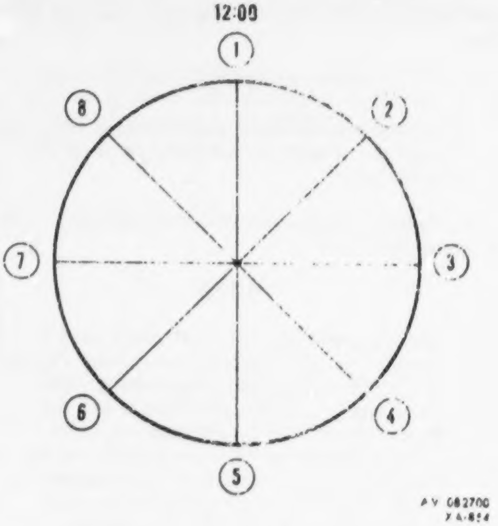


Figure 3-19. Eight-Point Tip Clearance Check Diagram

c. Using a feeler gage, check radial clearance between first stage turbine blade tip and turbine nozzle flange. Rotate turbine wheel one full turn and record minimum clearance over longest turbine blade at each position. (See figure 3-20.)

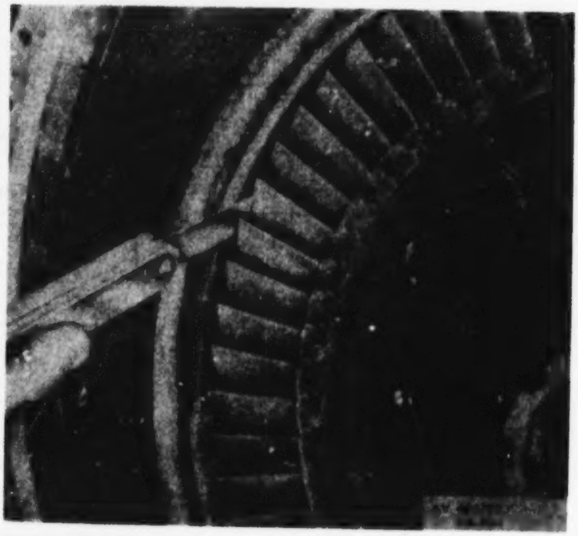


Figure 3-20. Checking First Stage Turbine Blade Tip Clearance (T53-L-7/7A)

d. If tip clearance is less than 0.025 inch on any blade, remove stock from inside diameter of first stage turbine nozzle flange to open clearance given in table 11-4, reference number 53. (Refer to paragraph 7-159.)

e. Install combustor turbine assembly. (Refer to paragraph 9-23.)

3-48. REMOVAL OF FIRST STAGE TURBINE ROTOR ASSEMBLY (T53-L-7/7A Engines). Proceed as follows:

NOTE

Do not remove first stage turbine rotor except to correct visible damage or to replace parts.

a. Remove combustor turbine assembly. (Refer to paragraph 3-44.)

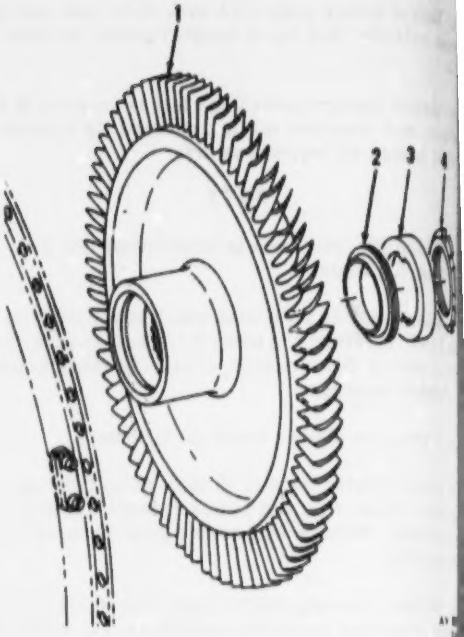
NOTE

Before removing the first stage turbine rotor, check for balance or mating marks on turbine wheel and compressor rotor rear shaft. If none are visible and the same wheel is to be reinstalled, paint mating marks on wheel and shaft, using ink or pencil as specified in paragraph 3-32. Before removing the first stage turbine rotor, check tip clearances. (Refer to paragraph 3-47.) Record these readings for reference at engine assembly.

b. Straighten compressor shaft rear bearing lockring (3, figure 3-21).

NOTE

Refer to table 3-4 for tools necessary to remove first turbine bearing retaining spanner nut (4, figure 3-21) and compressor turbine rear cone (2) in the following steps c. through f.



1. First Stage Turbine Rotor
2. Compressor Turbine Rear Cone
3. Compressor Shaft Rear Bearing Lockring
4. First Stage Turbine Bearing Retaining Spanner Nut

Figure 3-21. First Stage Turbine Rotor and Attaching Parts (T53-L-7/7A)

Table 3-4. Spanner Nut and Cone Removal and Installation Tools (T53-L-7/7A)

SHAFT HOLDING OR TORQUE FIXTURE	WRENCH SOCKET	POWER WRENCH	CONE REMOVAL TOOL ADAPTER	CONE REMOV TOOL
LTCT508	LTCT260 or LTCT4797	-	-	LTCT502 or LT 674 or LTCT4 Details of LTC 4675
LTCT860	LTCT587, Detail of LTCT860 or LTCT4675	-	-	LTCT502 or LT 674 or LTCT4 Detail of LTC 4675
LTCT4533	LTCT587, Detail of LTCT860 or LTCT4675	-	-	LTCT502 or LT 674 or LTCT4 Detail of LTC 4675
LTCT13430	LTCT13435, Detail of LTCT13430	PD2501	LTCT13676	LTCT6465

NOTE: This table lists the tools necessary for removing and installing the spanner nut and cone in the combinations that can exist.

bA. Position and secure torque fixture to first turbine rotor rear hub.

bB. Install wrench socket into torque fixture, engaging tangs of wrench socket with slots in retaining spanner nut (4).

bC. Using power wrench, remove nut (4) and lockring (3).

bD. Using cone removal tool and cone removal tool adapter, remove compressor turbine rear cone ([illegible]). Remove torque fixture from first stage turbine rotor rear hub.

NOTE

An alternate method to preceding steps bA. through bD. is shown in following steps c. through f.

Refer to table 3-4 for tools necessary to remove spanner nut, lockring, and cone in following steps c. through f.

c. Position and secure shaft holding fixture to dif- ser housing.

d. Install wrench socket into shaft holding fixture, gaging tangs of wrench socket with slots in retaining anner nut (4). Remove nut (4) and lockring (3).

Figure 3-22 deleted.

e. Using cone removal tool, remove compressor bine rear cone (2, figure 3-21).

f. Remove shaft holding fixture from diffuser sing.

g. Remove first stage turbine rotor (1).

9. REMOVAL OF AIR DEFLECTOR, FIRST AGE TURBINE NOZZLE AND FLANGE ASSEM- Y, COMBUSTION CHAMBER DEFLECTOR, REAR ARING SEAL, AND SEAL HOUSING (T53-L-7/7A ines). Proceed as follows:

NOTE

It is necessary to remove these parts only to correct visible damage or to re- place parts.

Remove combustor turbine assembly and first rbine rotor. (Refer to paragraphs 3-44 and)

CAUTION

osen all bolts before removing first bolt. e parts secured by these bolts should be ifted or rotated as necessary to relieve nding of bolts and to prevent damage to rts or threaded hole upon removal.

move bolts (16, figure 3-23) that secure air r (15) and first stage turbine nozzle assembly ear bearing support housing. Retain bolts for sing removal.

move air deflector and first stage turbine ssembly.

move shim (9). Record shim thickness.

move combustion chamber deflector (8).

NOTE

Do not remove seal housing (5) and seal (6), even though there may be carbon on seal face, unless engine oil consumption is excessive (refer to applicable airframe manual) and there is no evidence of loss through leaks in other parts of engine. For conditions that determine removal and replacement of seal, refer to paragraph 7-53.

f. Using three bolts (16, figure 3-23) as pullers, remove seal housing (5). Discard all bolts (16). Remove snapring (7) from housing and press seal (6) from housing with arbor press. Remove packing (4).

g. Remove shim (3) and record shim thickness for reassembly.

h. If seal housing is to be replaced, proceed as follows:

(1) Record dimension A (distance from mating flange surface to forward end of replacement seal housing).

(2) Record dimension C (distance from bearing housing rear flange to bearing retainer).

NOTE

Be certain that bearing retainer is not cocked and is bottomed against outer race.

(3) Subtract dimension C from dimension A to determine dimension B. Subtract 0.010 to 0.014 inch from dimension B to determine thickness of shim required to provide pinch on bearing outer race as given in table 11-4, reference number 63.

i. With liner (1, figure 3-23) installed on rear compressor shaft, thoroughly wipe and inspect liner for scoring of plated area or other damage.

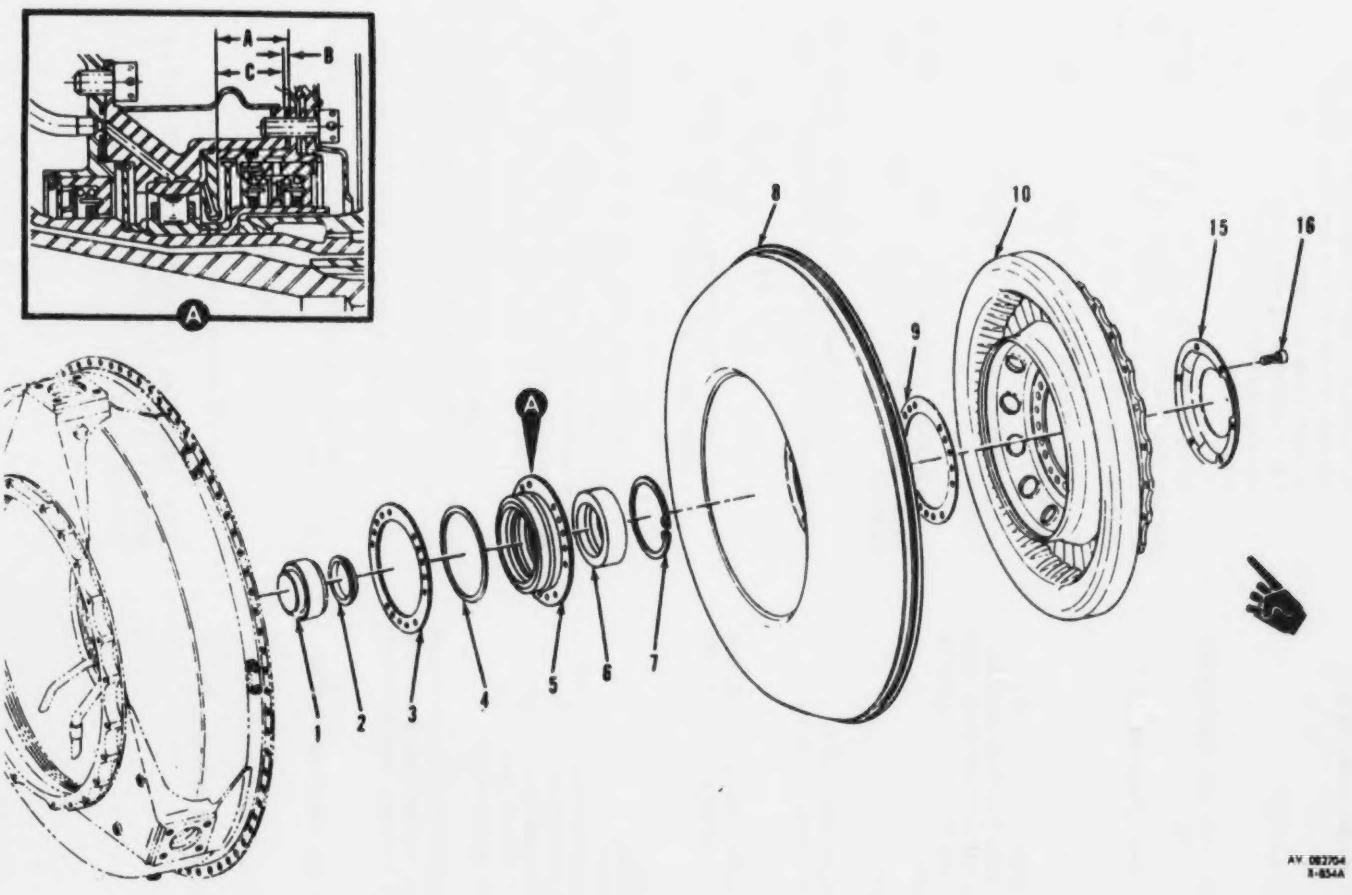
j. If no damage is evident, do not remove liner.

k. If damage is noted, remove liner with puller (LTCT843).

NOTE

Cone (2) will be removed with liner.

3-50. REMOVAL OF COMBUSTOR TURBINE ASSEMBLY (T53-L-15/701 Engines). (See figure 3-24.) Proceed as follows:


A
B
C
A
A
1
2
3
4
5
6
7
8
9
10
15
16
AV 082704
X-854A

1. Liner
2. Cone
3. Shim
4. Packing
5. Seal Housing
6. Seal

7. Snapring
8. Combustion Chamber
- Deflector
9. Shim
10. First Stage Turbine Nozzle and Flange Assembly

11. Deleted
12. Deleted
13. Deleted
14. Deleted
15. Air Deflector
16. Bolt

NOTE

Engine must be removed from aircraft before combustor turbine assembly can be removed.

Remove clamps that secure ignition coil and lead as- mbly to combustor turbine assembly. Disconnect ignition and lead assembly from four igniter plugs, and oil pres- and scavenge hoses.

Remove clamps that secure main fuel hose assembly to bustor turbine assembly. Disconnect main fuel hose as- bly from fuel control and flow divider assembly. Re- e hose assembly. Cap all open ports.

Remove clamps that secure starting fuel hose assem- to combustor turbine assembly. Disconnect starting fuel assembly from starting fuel solenoid valve and tee be- en halves of starting fueling manifolds.

(Deleted)

Remove bolt (13) and tablock (12) that secure cover (11) over (9). Remove cover (11).

Remove bolts (10) that secure cover (9) to exhaust ser.

Install three 1/4-28 puller screws in cover (9) at ap- imately 1-, 4-, 9-o'clock positions. Tighten puller screws ly and remove cover (9), seal (7) and packing (8). Dis- packing (8); seal (7) is reusable.

Straighten deformed rim of nut (6) at three places.

Install torque adjustment fixture (LTCT962) into rear mbustor turbine assembly and engage tangs of locking e assembly with slots in bearing retainer nut. Secure e assembly with three bolts.

Using wrench (LTCT505), remove nut and retain for se. (See figure 3-25.)

Using wrench (LTCT506), remove power shaft bolt (5, re 3-24) and shims (4).

NOTE

Record number and thickness of shims and attach shims, nut, and bolt to air diffuser.

A. Remove three bolts and torque adjustment fixture CT962) installed in step i.

Select the appropriate lifting device from table 3-3, de- ding on the position of the engine (horizontal or verti- (See figure 3-26.)

Secure the lifting device to a suitable hoist and to the bustor turbine as outlined in table 3-3.

A. Mark relationship of combustor turbine to air ser using an approved marking pencil.

n. Using wrench (LTCT393), remove bolts (2, figure 3-24) and nuts (1) that secure combustor turbine assembly (3) to diffuser housing.

NOTE

Using marking pencil (item 72, table 2-2), identify and mark all bolt holes at which brackets were secured.

o. Remove combustor turbine assembly sufficiently to mark relationship of power shaft to power turbine shaft using approved marker.

NOTE

Marking is required for proper reinstallation of same combustor turbine. Do not rotate engine, combustor turbine assembly, or power turbine assembly until marking is accomplished.

p. Remove combustor turbine assembly and place on suitable work surface.

q. Perform power shaft bolt flange depth measurement. (Refer to paragraph 3-51.)

3-51. POWER SHAFT BOLT FLANGE DEPTH MEASUREMENT (T53-L-15/701 Engines). The original power shaft bolt flange depth must be measured and recorded for reference. Flange depth measurement governs size of shims (4, figure 3-24) placed under head of power shaft bolt (5) to locate power shaft within engine correctly.

a. With combustor turbine assembly on bench, install original shims (4), power shaft bolt (5), and nut (6). Tighten nut snugly, using wrench (LTCT505). Remove torque adjustment fixture (LTCT962). With exhaust diffuser rear face down, set locating button bar (LTCT153) on combustor housing flange, and install measuring tool (LTCT6124) in power turbine splines. (See figure 3-27.)

b. With vernier depth gage, measure from top of bar to top of measuring tool (dimension A). With vernier depth gage, measure from top of bar to combustor flange (dimension B).

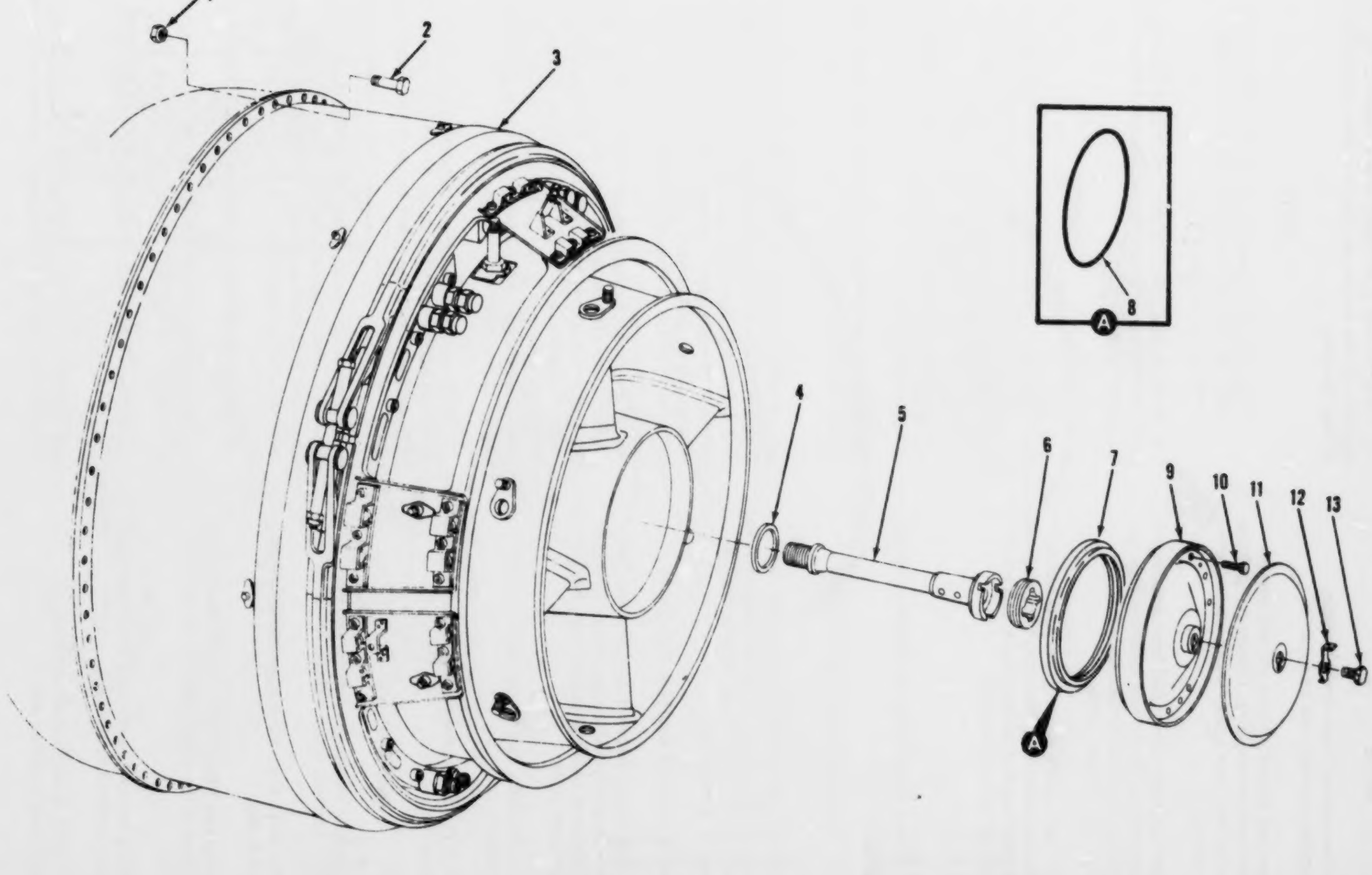
c. Subtract dimension B from dimension A. Resulting dimension, plus length of alignment tool (dimension C), is flange depth. Record and retain this measurement for reference during assembly.

d. Install torque adjustment fixture (LTCT962).

e. Remove nut (6, figure 3-24) and bolt (5) and attach shims to bolt with lockwire.

f. Remove torque adjustment fixture (LTCT962).

3-52. REMOVAL OF GAS PRODUCER SYSTEM COMPONENTS (T53-L-15/701 Engines). Proceed as follows:


A
A
AV 082705
X-834

Key to Figure 3-24.

1. Nut
2. Bolt
3. Combustor Turbine Assembly
4. Shim
5. Power Shaft Bolt
6. Nut
7. Seal
8. Packing
9. Cover
10. Bolt
11. Cover
12. Tablock
13. Bolt

Figure 3-25. Removing Power Shaft Internal Wrenching Nut (T53-L-15/701)

NOTE

Removal of gas producer turbine rotor and nozzle assemblies is not required for inspection. Removal is limited to gaining access for necessary repair or replacement of components.

Check second stage gas producer turbine rotor nimum tip clearances as follows. (See figure

(1) Insert feeler gage with 1/4 inch wide tip Model 172E or equivalent) between second stage gas producer turbine rotor assembly (42, figure 3-28, sheet 2) and second stage gas producer cylinder (51) at 12-o'clock position.

CAUTION

When marking blade in following step (2) do not use lead pencil to mark blade.

(2) Rotate turbine rotor and check and record minimum tip clearance (longest blade). Mark longest blade with yellow marking pencil (item 72, table 2-2). (Refer to paragraph 3-32.)

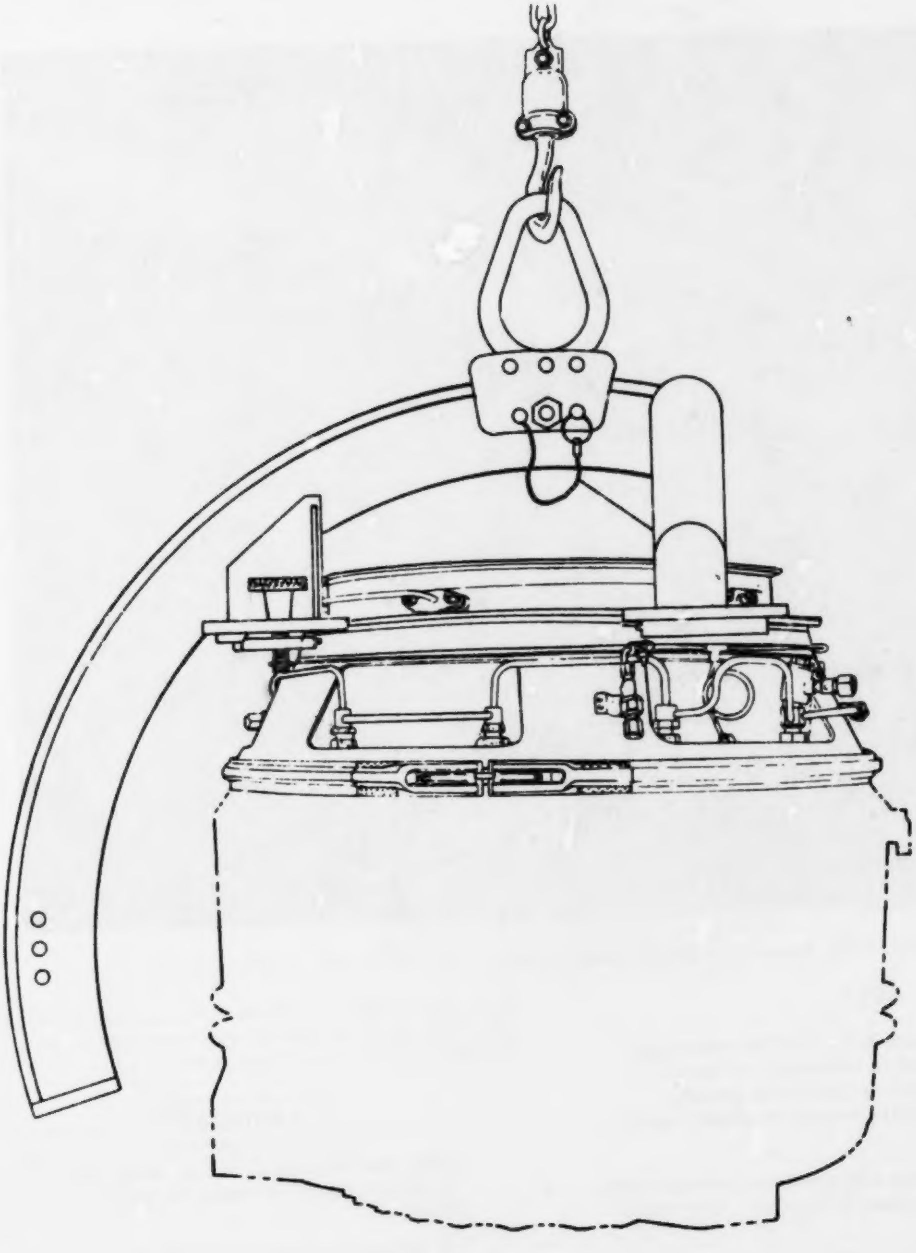


Figure 3-26. Removing Combustor Turbine Assembly (Typical)

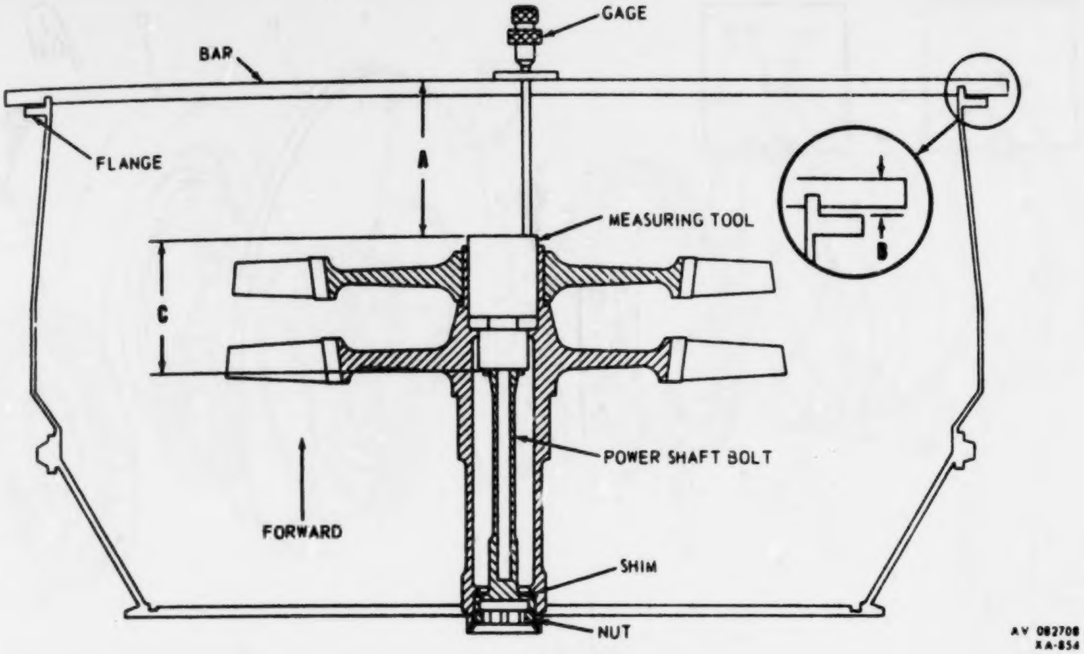


Figure 3-27. Measuring Power Shaft Bolt Flange Depth (T53-L-15/701)

(3) Check clearance between tip of longest blade and flange at seven additional positions. (See figure 3-19.) Hold feeler gage stationary at each position and turn rotor one full turn. If tip clearance at any position is 0.020 inch or less, flange must be reworked at reassembly. (Refer to paragraph 7-169.) If flange is not to be reworked, proceed to following step b.

NOTE

Minimum acceptable tip clearance at inspection is as given in table 11-4, reference number 78. However, when rework is to be accomplished, it is suggested that a tip clearance of 0.027 inch be established.

(4) Locate areas to be reworked as follows:

(a) Insert 0.027 inch feeler gage between tip of longest blade and second stage gas producer cylinder as near as possible to area of least tip clearance.

(b) Rotate turbine wheel and feeler gage together until stopped by an area of less clearance.

(c) At stopping point, mark edge of cylinder flange with yellow marking pencil (item 72, table 2-2).

(d) Remove feeler gage and turn rotor until long blade is past high point far enough to allow 0.027 inch feeler gage to be inserted.

(e) Reinsert feeler gage between long blade and cylinder flange.

(f) Rotate turbine wheel and feeler gage together, in the reverse direction, until stopped by an area of less clearance.

(g) Mark cylinder flange as before and connect the two marks to show area to be reworked.

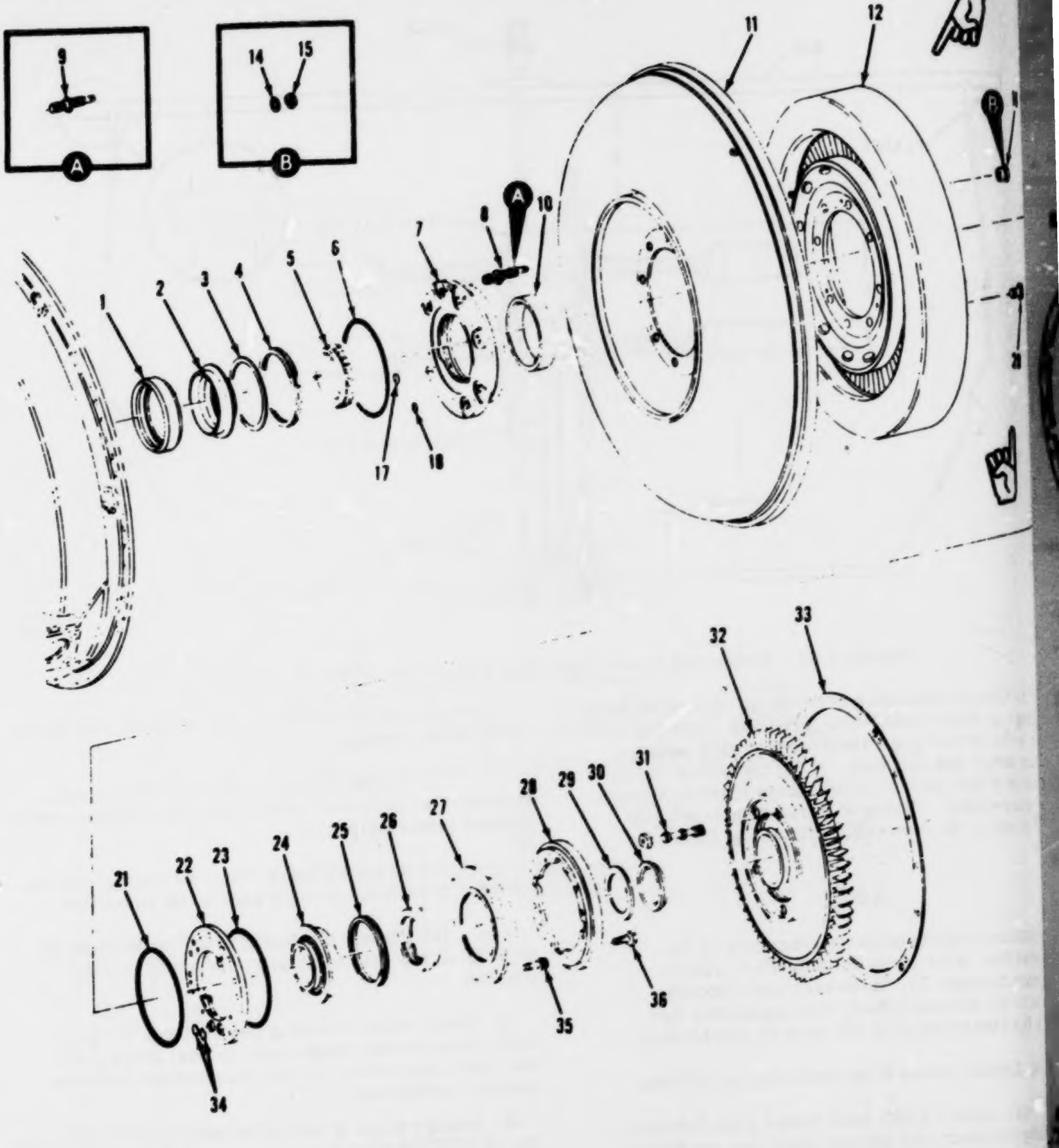
(h) Repeat preceding steps (a) through (g) until all areas that must be reworked have been located.

b. Using yellow marking pencil (item 72, table 2-2), index second stage rotor to first stage rotor and first stage rotor to rear compressor shaft for correct reassembly.

c. Engage tangs of socket wrench (LTCT13456, detail of LTCT13175) or socket wrench (LTCT4181) with nut (50, figure 3-28, sheet 2) to prevent compressor rotor shaft from turning.

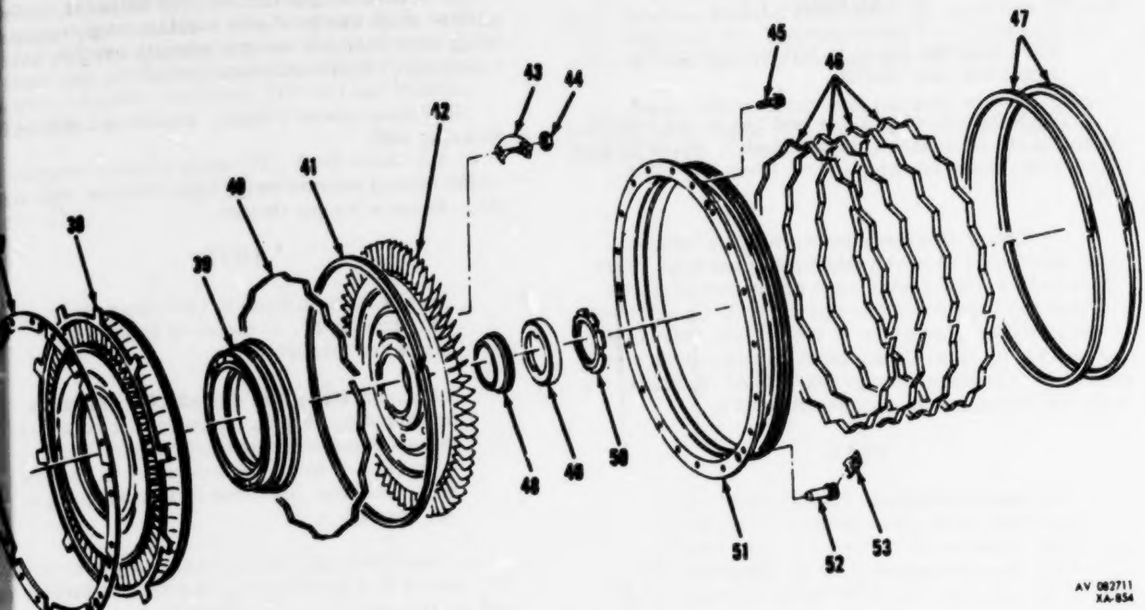
d. Straighten tabwashers (43) and remove nuts (44), and tabwashers (43) that secure second stage gas producer turbine rotor assembly (42) to spacer (39).

e. Using puller (LTCT691), carefully remove second stage gas producer turbine rotor assembly (42).



1. Forward Seal
2. Forward Oil Ring
3. Spacer
4. Retaining Ring
5. Bearing Inner Race and Rollers
6. Seal
7. Rear Bearing Housing Assembly
8. Stud (1-110-131-04)
9. Stepped Stud (1-110-131-02)
10. Bearing Outer Race
11. Combustion Chamber Deflector
12. First Stage Gas Producer Nozzle Assembly
13. Deleted
14. Washer
15. Nut (NAS509-4)
16. Nut (1-110-134-01)
17. Packing
18. Packing
19. Deleted
20. Bolt
21. Seal
22. Retaining Plate
23. Gasket
24. Aft Oil Ring
25. Retaining Ring
26. Seal
27. Retainer
28. Sealing Ring
29. Spacer
30. Forward Cone
31. Bolt
32. First Stage Ga ducer Turbine Assembly
33. Spacer
34. Packing
35. Bolt
36. Bolt

Figure 3-28. Gas Producer System Components (T53-L-15/701) (Sheet 1 of 2)



37. Ring
38. Second Stage Gas Producer Nozzle Assembly
39. Spacer
40. Expansion Spring
41. Seal Ring
42. Second Stage Gas Producer Turbine Rotor Assembly
43. Tabwasher
44. Nut
45. Bolt
46. Expander Spring
47. Seal Ring
48. Rear Cone
49. Lockring
50. Nut
51. Second Stage Gas Producer Cyliner
52. Pin
53. Retaining Plate

Figure 3-28. Gas Producer System Components (T53-L-15/701) (Sheet 2 of 2)

NOTE

When removing spacer (39) in following step f, use the thumbscrews to position the arms into the spacer. When the arms are in position, firmly lock them with the knurled cup; then back off at least one-half turn to allow the puller to operate freely and prevent binding of the thumbscrews.

Using spacer mechanical puller (LTCT4842 or
T4045), remove spacer (39) from second stage gas pro-
turbine rotor assembly (42).

Remove seal rings (47) and expander spring (46) from
de diameter of second stage gas producer cylinder (51).

NOTE

In following step h, discard bolts, MS9060-08, (45) and bolts, MS9705-08, (45). Bolts, 1-110-262-01, (45) may be retained for re-use.

Remove bolts (45) that secure second stage gas pro-
cylinder to first stage gas producer nozzle assembly
heet 1). Remove retaining plates (53, sheet 2).

i. Using locating pin removal tool (LTCT4692), remove pins (52). Remove second stage gas producer cylinder (51).

j. Remove seal ring (41) and expansion spring (40) from outside diameter of second stage gas producer nozzle. Remove ring (37), spacer (33, sheet 1), and second stage gas producer nozzle assembly (38, sheet 2).

NOTE

Record thickness of spacer (33, sheet 1) for reassembly.

CAUTION

When taking tip clearances in following step k., exercise care so that coating on tips of blades is not damaged.

k. Check first stage gas producer rotor for minimum tip clearances as follows:

(1) Insert feeler gage with 1/4 inch wide tip between first stage gas producer turbine rotor assembly (32) and first stage gas producer nozzle assembly (12) at 12 o'clock position.

CAUTION

When marking blade in following step (2), do not use lead pencil.

(2) Rotate turbine rotor and check and record minimum tip clearance (longest blade). Mark longest blade with yellow marking pencil (item 72, table 2-2).

(3) Check clearance between tip of longest blade and flange at seven additional positions. (See figure 3-19.) Hold feeler gage stationary at each position and turn rotor one full turn. If tip clearance at any position is as given in table 11-4, reference number 81, or less, flange must be reworked at reassembly. (Refer to paragraph 7-169.) If flange is not to be reworked, proceed to step l.

NOTE

Minimum acceptable tip clearance at inspection is as given in table 11-4, reference number 81. However, when rework is to be accomplished, it is suggested that a tip clearance of 0.027 inch be established.

(4) Locate areas to be reworked as follows:

(a) Insert 0.027 inch feeler gage between tip of longest blade and second stage gas producer nozzle cylinder as near as possible to area of least tip clearance.

(b) Rotate turbine wheel and feeler gage together until stopped by an area of less clearance.

(c) At stopping point, mark edge of cylinder flange with yellow marking pencil (item 72, table 2-2).

(d) Remove feeler gage and turn rotor until long blade is past high point far enough to allow 0.027-inch feeler gage to be inserted.

(e) Reinsert feeler gage between long blade and cylinder flange.

(f) Rotate turbine wheel and feeler gage together, in reverse direction, until stopped by an area of less clearance.

(g) Mark cylinder flange as before and connect the two marks to show area to be reworked.

(h) Repeat steps (a) through (g) until all areas that must be reworked have been located.

l. Straighten tabs of lockring (49, figure 3-28, sheet 2).

NOTE

When installing torque fixture in following step 1A., ensure that bolts are drawn completely through fixture. Refer to table 3-5 for tools necessary to remove the nut and cone in following steps 1A. through 1C.

lA. Install torque fixture over bolts (31, sh
of first stage gas producer turbine rotor, eng
tangs of wrench socket with slots in nut (50, sh
and secure fixture with nuts (44).

1B. Using power wrench, remove nut (50)
lockring (49).

lC. Using cone removal tool, remove rear c
(48). Remove torque fixture.

NOTE

An alternate method to preceding steps lA. through lC. is shown in following steps m. through p.

When installing hub and adapter assembly
in following step m., ensure that bolts ar
drawn completely through fixture. Refer
to table 3-5 for tools necessary to remov
nut, lockring, and cone in following steps
m. through p.

m. Install hub and adapter assembly over bo
(31, sheet 1) of first stage gas producer turbin
and secure with nuts (44, sheet 2).

n. Position and secure holding fixture to dif
housing.

o. Using wrench socket engage tangs of wre
with slots in nut (50). Remove nut (50) and lock
(49).

p. Using cone removal tool, remove rear co
(48). Remove shaft holding fixture and hub and
adapter assembly.

q. Remove first stage gas producer turbine r
assembly (32, sheet 1).

r. Using yellow marking pencil (item 72, ta
2-2), index bolts (31) for correct reassembly.
move bolts (31), from rotor assembly.

s. Remove bolts (36), securing sealing ring
Remove sealing ring.

t. Remove bolts (35), that secure retainer
Remove retaining ring (25), seal (26), and ret
(27) as a unit.

u. Using adapter and guide (LTCT3685) and
(LTCT2121), remove forward cone (30), spac
and aft oil ring (24).

v. Remove gasket (23), retaining plate (22)
ing (34), and seal (21).

NOTE

Washers (14) are installed only when stepped stud (9) and nut (15) are installed.

To prevent studs from turning, hold stud ends
removing nuts (16 or 15), washers (14), bolts
and washers (19) that secure support plate (13),
stage gas producer nozzle assembly (12), and
ustion chamber deflector (11) to rear bearing
ing assembly (7).

Remove support plate (13), first stage gas pro-
nozzle assembly (12), and combustion chamber
ctor (11).

y. Remove stepped studs (9) or studs (8). Remove rear bearing housing assembly (7), packings (17 and (18), and seal (6). Bearing outer race (10) will remain in rear bearing housing assembly (7).

z. Using arbor press and suitable sleeve, press bearing outer race (10) from rear bearing housing assembly (7).

Table 3-5. Nut and Cone Removal and Installation Tools (T53-L-15/701)

OLD- URE	WRENCH SOCKET	POWER WRENCH	HUB AND ADAPTER ASSEMBLY	CONE REMOVAL TOOL
6	LTCT584 detail of LTCT576 or LTCT4676		LTCT3076 detail of LTCT576 or LTCT4676	LTCT786 or LTCT4677 detail of LTCT4676
533	LTCT584 detail of LTCT576 or LTCT4676		LTCT3076 detail of LTCT576 or LTCT4676	LTCT4677 detail of LTCT4676
3175	LTCT13456 detail of LTCT13175	PD2501		LTCT6465
This table lists the tools necessary for removing and installing the nut and cone in the combinations that can exist.				

Using mechanical puller (LTCT4809), remove inner race and rollers (5) from compressor . (See figure 3-29.)

Using puller (LTCT4843), remove forward (2, figure 3-28, sheet 1).

Remove retaining ring (4) and spacer

Using forward seal puller (LTCT4568) with LTCT4571), remove forward seal (1).

REMOVAL OF REDUCTION GEAR ASSEM- GEARSHAFT, AND TORQUEMETER AND CYLINDER (T53-L-7/7A/15 Engines). follows:

a. Install socket, SWE8673L, anchor plate, SWE 8473-1W, and power wrench, SWE8100 on propeller shaft. (See figure 3-30.)

b. Loosen nut (1, figure 3-31); then remove power wrench, anchor plate, and socket.

NOTE

Do not remove nut at this time.

c. Remove nuts (2) and washers (3).

d. Install lifting adapter (LTCT181) on propeller shaft and attach suitable hoist to clamp eye. (See figure 3-32.) Support weight with hoist.

Figure 3-29. Removing Compressor Rear Bearing

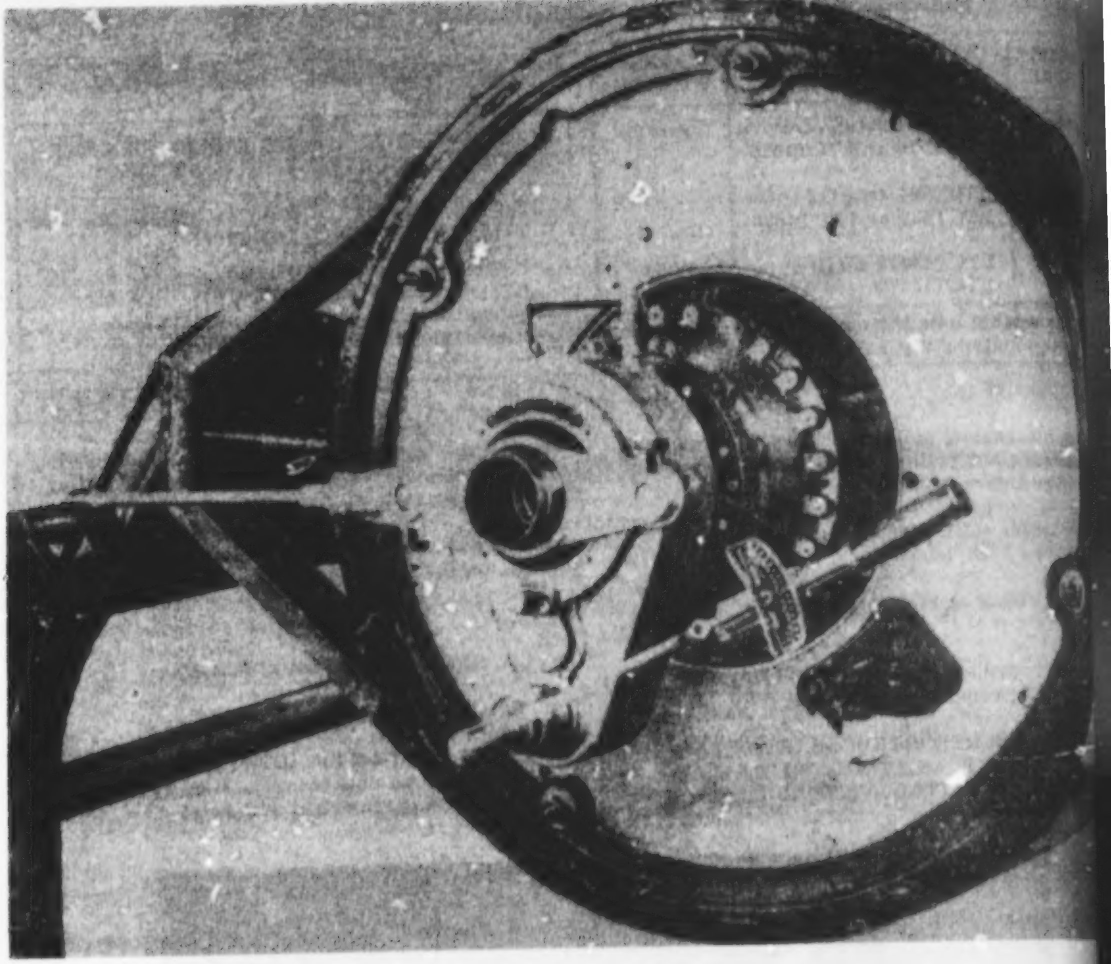


Figure 3-30. Loosening Thrust Nut

e. Install three 1/4-20 puller screws in puller holes positioned between raised bosses of reduction gear assembly (4, figure 3-31) at approximately 1-, 4-, and 8-o'clock positions.

CAUTION

When withdrawing reduction gear assembly in following step f., keep reduction gear horizontal by applying downward force on handle of hoisting adapter while sliding reduction gear assembly free of inlet housing to prevent damage to inlet housing studs.

NOTE

Provide a suitable container to catch oil when reduction gear assembly is separated from inlet housing.

f. Tighten puller screws evenly and withdraw reduction gear assembly.

g. Remove and discard packing (5).

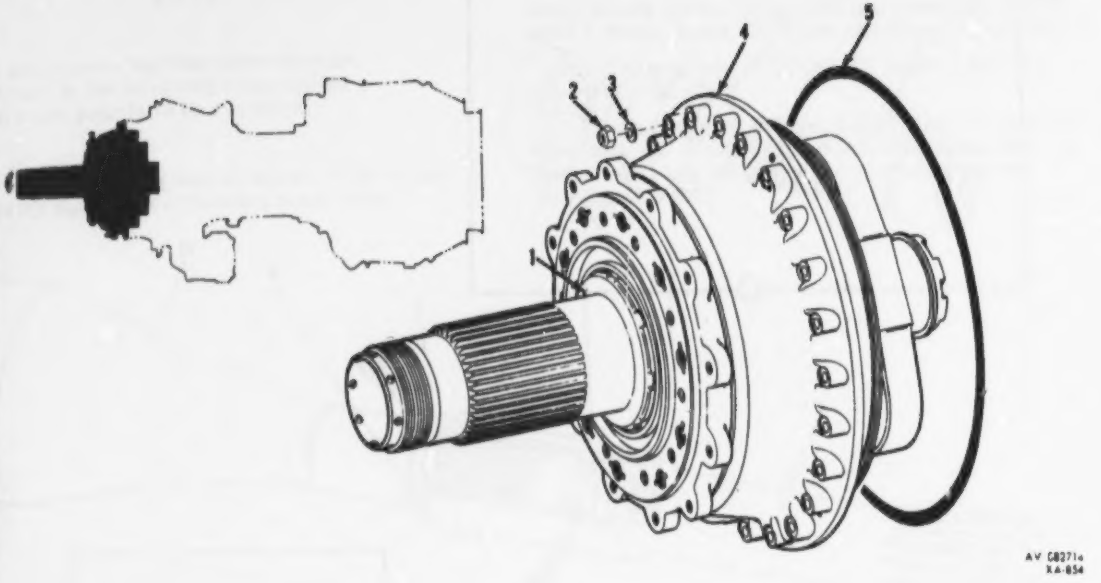
h. If seal rings (36 and 37, figure 6-22) a aged, remove from propeller shaft carrier b ing pressure to a point on each ring, 180 deg from interlocking ends. Spread ends and re discard rings.

i. Position holding fixture (LTCT570) on of inlet housing and secure with four nuts. B that sun gearshaft (4, figure 3-33) is fully en with teeth of holding fixture.

j. Install tool set (LTCT509) and hand-tig center rod into engine sun gear bolt, back off turn, insert allen wrench in center rod and ho and engage tabs in slot in bolt, turn handle clo straighten tabs of bolt retainer (2). (See figure

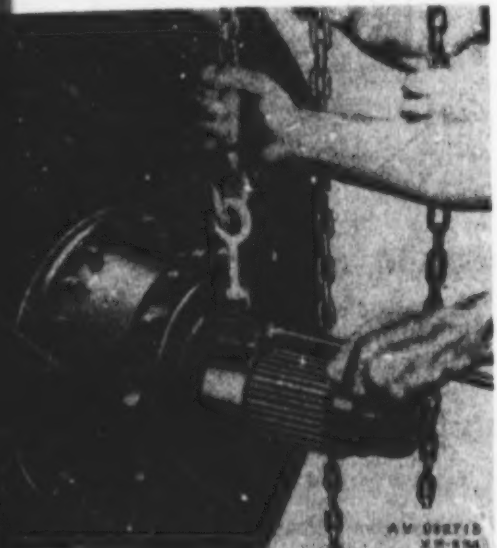
k. Using driver wrench (LTCT258), remov tainer bolt (1, figure 3-33), bolt retainer (2), vex washer (3).

l. Remove holding fixture and sun gearsh Discard packing (5).



1. Nut 2. Nut 3. Washer 4. Reduction Gear Assembly 5. Packing

Figure 3-31. Reduction Gear Assembly and Attaching Parts (T53-L-7/7A/15)



re 3-32. Removal of Reduction Gear Assembly (Typical)

NOTE

The following steps m. through p. apply to T53-L-7/7A engines.

Install mechanical puller (LTCT2021) on power with legs positioned behind sun gear sealing).

n. Holding cup remover in place, push power shaft aft until legs of remover rest against bearing clamping plate of power shaft bearing retainer. Rotate handle of cup remover until legs are braced against heads of clamping plate bolts.

o. Continue to rotate handle until sealing cup has been jacked free of power shaft.

p. Remove power shaft sleeve retainer (8).

q. Using hex head socket, remove torquemeter valve body (1, figure 3-35) and shim (2) from torquemeter cylinder (4). Record shim thickness.

r. Remove bolts (3) and torquemeter cylinder (4).

3-54. REMOVAL OF REDUCTION GEAR ASSEMBLY AND SUN GEARSHAFT (T53-L-701 Engine). Proceed as follows:

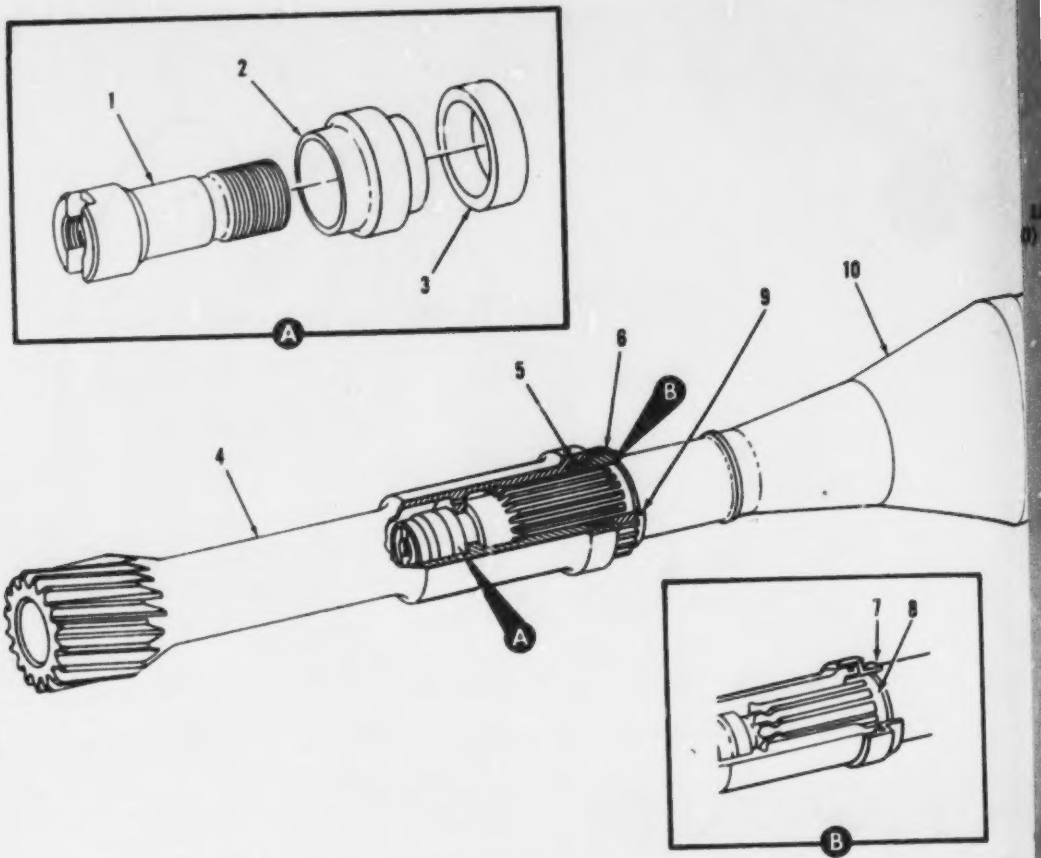
a. Remove nuts (1, figure 3-36) and washers (2).

b. Install lifting adapter (LTCT181) as follows: (See figure 3-32.)

(1) Align adapter so that pins can be inserted in front of shaft.

(2) Tighten thumbscrew to engage rear of shaft.

(3) Attach suitable hoist to clamp eye and take sufficient strain on hoist to support reduction gear assembly weight.



1. Retainer Bolt
2. Bolt Retainer
3. Convex Washer
4. Sun Gearshaft
5. Packing
6. Spur Gear
7. Sun Gear Sealing Cup (T53-L-7/7A)
8. Power Shaft Sleeve Reta (T53-L-7/7A)
9. Retainer Ring
10. Power Shaft

Figure 3-33. Sun Gearshaft (T53-L-7/7A/15) - Exploded View

c. Thread three bolts (LTCT1429) into puller holes positioned between raised bosses of reduction gear assembly at approximately the 1-, 4-, and 8-o'clock positions.

CAUTION

The reduction gear weighs approximately 190 pounds. To prevent damage to inlet housing studs, keep reduction gear horizontal by applying downward force on hoisting adapter handle while sliding reduction gear assembly free from inlet housing.

NOTE

Provide suitable container to catch oil at separation.

d. Thread bolts evenly into threaded hole withdraw reduction gear assembly away fro housing.

e. Remove oil transfer tubes (7A and 11, 3-36). Remove and discard tube packings (7

f. Remove and discard packing (7).

g. Remove screws (6) that secure seco rier assembly (5) to reduction gear assemb

h. Using three bolts (LTC T1428), jack se carrier assembly from reduction gear hous

i. Remove and discard packing (4).

NOTE

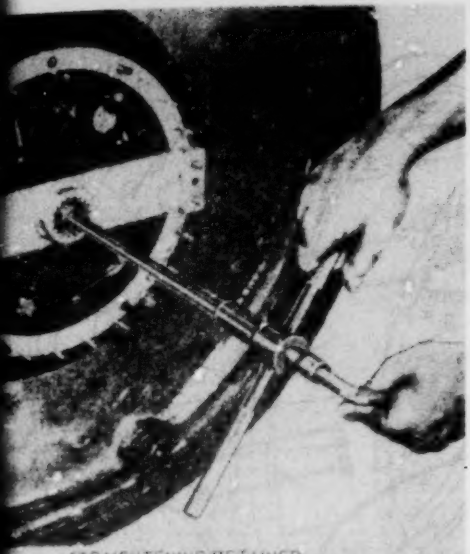
Do not remove bearing inner race as outlined in the following steps unless reduction gear is to be replaced.

. Straighten locking cup (9, figure 3-36) on nut securing rear support bearing inner race.

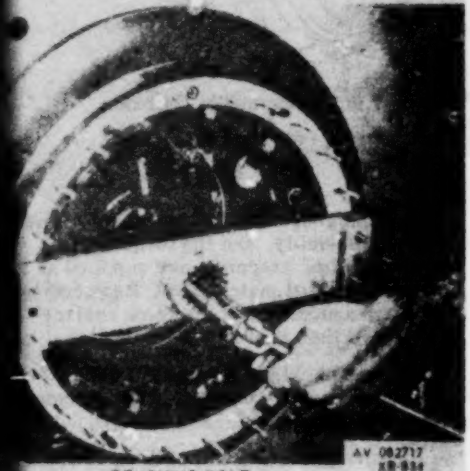
iB. Using handle (LTCT182) to secure propeller shaft, break torque of nut (10) using wrench (LTCT 6605). Remove nut. Remove and discard lockring.

iC. Using puller (LTCT6723), remove bearing inner race (8).

j. Install holding fixture (LTCT6985) on studs of inlet housing. Ensure that teeth of sun gearshaft (4, figure 3-37) are fully engaged in holding fixture. (See figure 3-34.)



STRAIGHTENING RETAINER



REMOVING BOLT

-34. Straightening Retainer and Removing from Sun Gearshaft (T53-L-7/7A/15)

CAUTION

extreme care when withdrawing or ling sun gearshaft. Careless handling result in damage to torquemeter com- nts.

NOTE

sun gearshaft assembly, torquemeter assembly, and the torquemeter junc- box assembly are supplied as a pre- rated matched set. Replacement of assembly necessitates replacement of et. For removal and installation of emeter junction box assembly, refer agraphs 5-127 and 5-128.

k. Install tool set (LTCT509) and hand-tighten tool center rod into engine sun gear bolt, back off one-quarter turn, insert allen wrench in center rod and hold. Align and engage tabs in slot in bolt, turn handle clockwise to straighten tabs of bolt retainer (2, figure 3-37). Remove tool set.

l. Using driver wrench (LTCT258), remove retainer bolt (1), bolt retainer (2), and convex washer (3).

m. Remove holding fixture and carefully withdraw sun gearshaft (4).

n. (Deleted)

o. (Deleted)

p. (Deleted)

3-55. REMOVAL OF REAR BEARING SUPPORT ASSEMBLY (T53-L-7/7A/15 Engines). Proceed as follows:

a. Remove reduction gear assembly and sun gearshaft. (Refer to paragraph 3-53.)

b. Remove bolts (6, figure 3-38) and washers (5).

c. Install three 1/4-20 puller screws at approximately 3-, 7-, and 11-o'clock positions. (See figure 3-39.)

d. Tighten puller screws evenly; then remove propeller shaft rear bearing support assembly (1, figure 3-38).

e. Remove puller screws. Remove packings (2, 3, and 4).

3-56. REMOVAL OF REAR BEARING SUPPORT ASSEMBLY, SUN GEAR SUPPORT ASSEMBLY, TORQUEMETER HEAD ASSEMBLY, TORQUEMETER HEAD SUPPORT, AND ACCESSORY DRIVE CARRIER ASSEMBLY (T53-L-701 Engine). Proceed as follows:

NOTE

Removal of sun gearshaft, torquemeter junction box, and torquemeter head is allowed only to gain access to other components. Field replacement is not authorized.

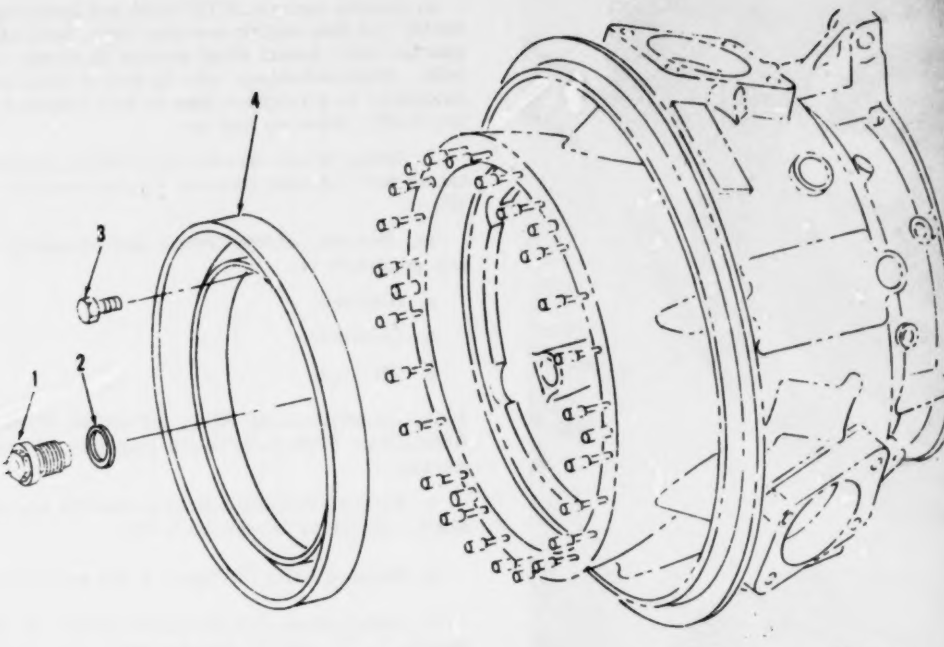
a. If installed, remove reduction gear and sun gearshaft (refer to paragraph 3-54) and torquemeter junction box (refer to paragraph 5-127). Remove bolts (1, figure 3-40) and washers (2) that retain rear bearing support assembly (3), torquemeter head support assembly (14), and accessory drive carrier assembly (18).

b. Withdraw rear bearing support assembly. Remove packings (4 and 5).

c. Remove bolts (6) and withdraw main sun gear support assembly (7).

d. Remove screws (8) and retaining strap (9).

e. Remove bolts (10) and tabwasher (10A) and permit electrical torquemeter head assembly (11) to hang aside.



1. Torquemeter Valve Body 2. Shim 3. Bolt 4. Torquemeter Cylinder

Figure 3-35. Torquemeter Cylinder and Related Parts (T53-L-7/7A/15)

f. Remove flat-head screws (13) and carefully remove torquemeter head support assembly (14). Remove packing (15).

fA. Using puller (LTCT2021), remove spur gear (2, figure 3-40A).

fB. Remove packing (1) from gear.

fC. Remove retaining ring (3).

g. If installed, remove accessory drive gearbox (refer to paragraph 3-34), power takeoff shaft (refer to applicable airframe manual), and overspeed governor and tachometer drive assembly (refer to paragraph 3-42).

gA. While supporting torquemeter head, install torquemeter removal tool (LTCT13686), push connector sleeve assembly into inlet housing cavity, retrieve from inside, and remove entire assembly from inlet housing. Remove packings (12).

CAUTION

While withdrawing accessory drive carrier in following step h., oil transfer tube (21, figure 3-40) may fall free.

h. Withdraw accessory drive carrier assembly (18). Remove packings (16 and 17).

i. Remove oil transfer tube (21). Remove packings (22).

j. Remove screws (23) and washers (24) that secure torquemeter lockplates (25). Remove lockplates.

k. (Deleted)

NOTE

The sun gearshaft assembly, torquemeter head assembly, and the torquemeter junction box assembly are supplied as a precalibrated matched kit. Replacement of one assembly necessitates replacement of the kit at Depot level only.

l. Remove packings (19 and 20, figure 3-40 grooves in accessory drive carrier assembly ing face of inlet housing.

m. Remove plate (26) and packing (27).

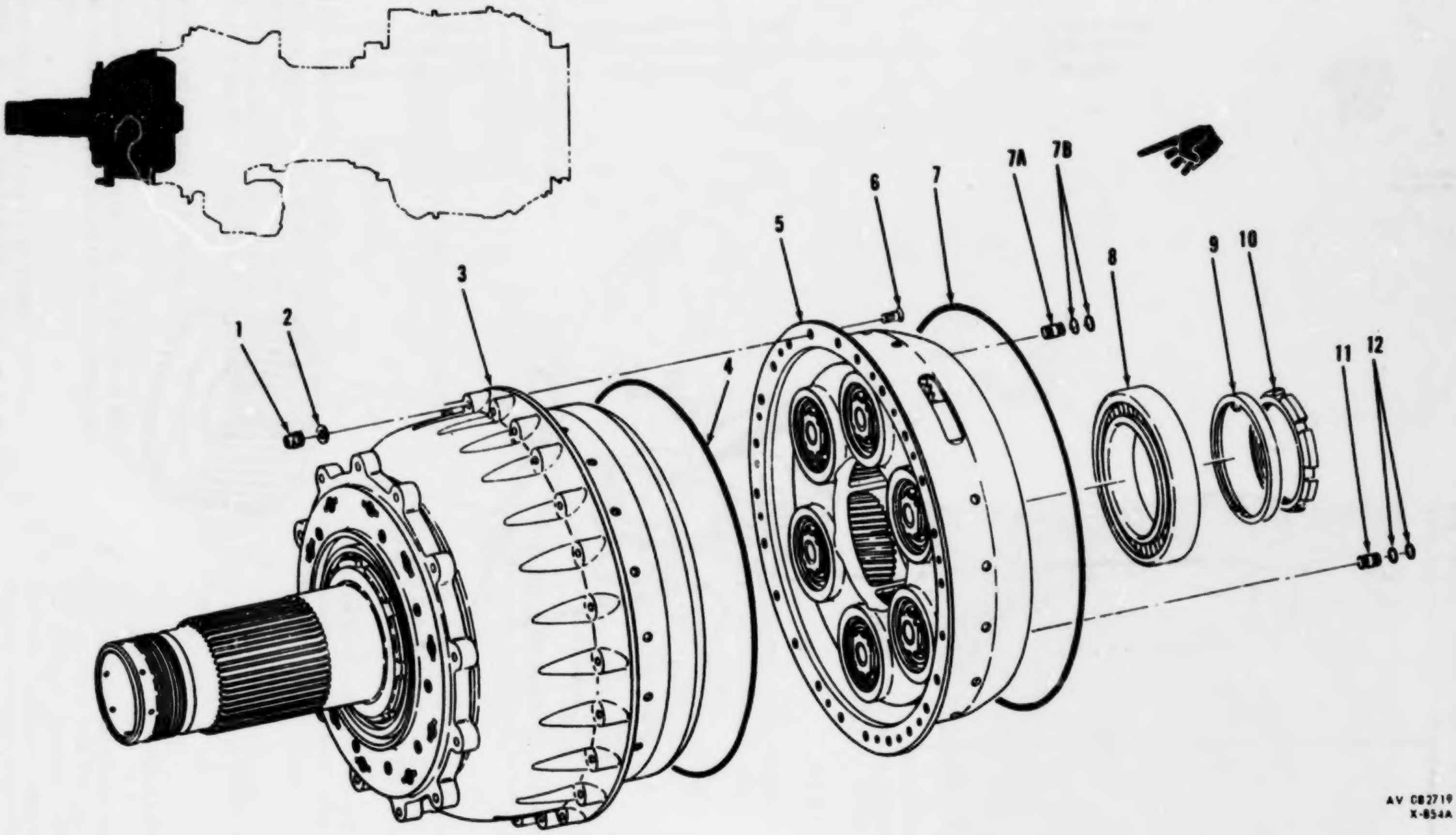
3-57. REMOVAL OF COMPRESSOR AND IMP HOUSING ASSEMBLIES. (See figure 3-41.) Pr as follows:

CAUTION

Remove only one compressor housing assembly half at any one time. Do not distu bolts that secure compressor and impelle housing assembly half, which is not bein removed, to diffuser and inlet housing.

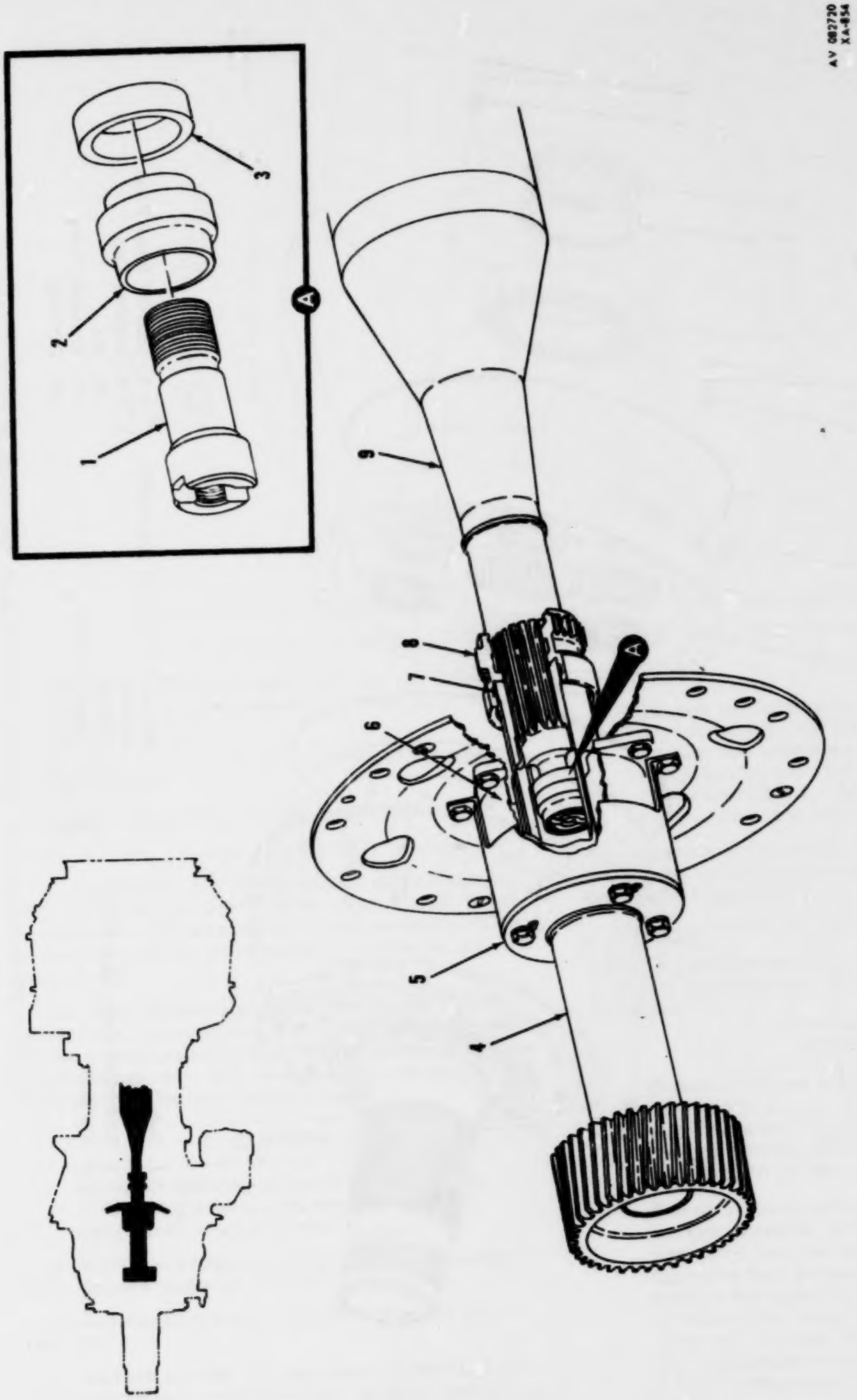
The shim found between the compressor housing assembly and the impeller housi assembly, and the extra washers betwee the bleed band actuator and the mounting boss on the impeller housing, must be re installed after repairs are completed. However, if a new impeller housing is be ing installed,the shim and extra washers are to be discarded.

a. Remove attaching lines, hoses, and acce

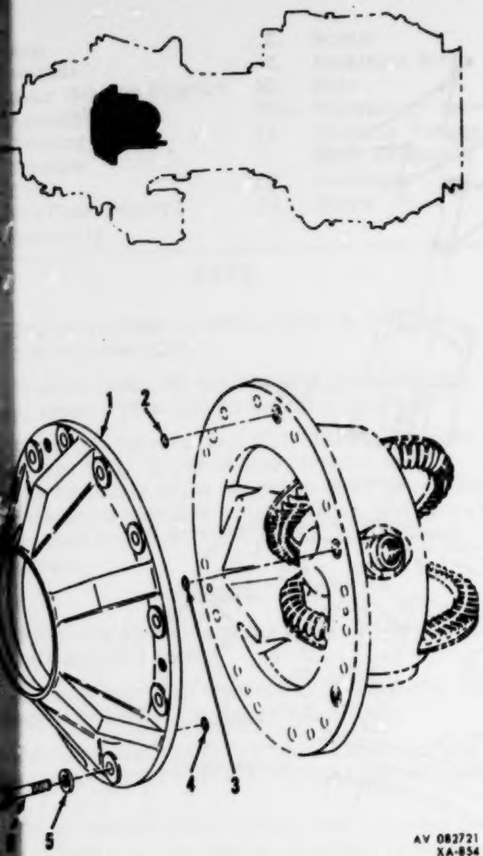

1
2
3
4
5
6
7
7A
7B
8
9
10
11
12
AV CB2719
X-854A

1. Nut
2. Washer
3. Reduction Gear Assembly
4. Packing
5. Secondary Carrier Assembly
6. Screw
7. Packing
7A. Transfer Tube
7B. Packing
8. Bearing Inner Race
9. Locking Cup
10. Nut
11. Transfer Tube
12. Packing

Figure 3-36. Reduction Gear Assembly, Sun Gearshaft, and Attaching Parts (T53-L-701)


AV 082720
XA-854
A
1
2
3
4
5
6
7
8
9

1. Retainer Bolt
2. Bolt Retainer
3. Convex Washer
4. Sun Gearshaft
5. Sun Gearshaft Support Assembly
6. Torquemeter Head
7. Packing
8. Spur Gear
9. Power Shaft



1. Rear Bearing Support Assembly
Packing
Packing
4. Packing
5. Washer
6. Bolt

re 3-38. Rear Bearing Support and Attaching Parts (T53-L-7/7A/15)

NOTE

hen a bracket is released by removal a bolt, secure bolt, washer, and nut to acket until ready for installation. To cilitate installation of housings, identify d mark position of all removed items.

eps b. and c. apply to housing with pered pins.

installed, remove nuts (16) and washers (17) r locating tapered pins (18) on the compres- ge.

ing pin removal tool (LTCT4895) remove pins (18). (See figure 3-42.) Tapered pins be removed by threading drive pin punch 04) onto tapered pins. Using pin removal backup tool (LTCT488) to back up compressor housing flange, remove tapered pins by striking punch with hammer. (See figure 3-43.)

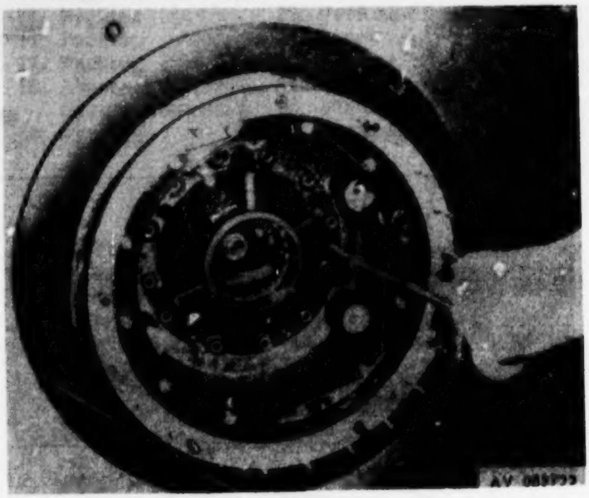


Figure 3-39. Removing Rear Bearing Support (T53-L-7/7A/15)

NOTE

Following steps d. and e. apply to housing with hollow dowels.

d. If installed, remove nuts (15, figure 3-41), washers (19), and bolts (21) from four hollow dowels (20) on the compressor flange.

e. Using mechanical puller (LTCT1218) and slide hammer adapter (LTCT6740), remove dowels.

f. Remove bolts (6) and washers (7) that secure compressor housing assembly half to inlet housing assembly.

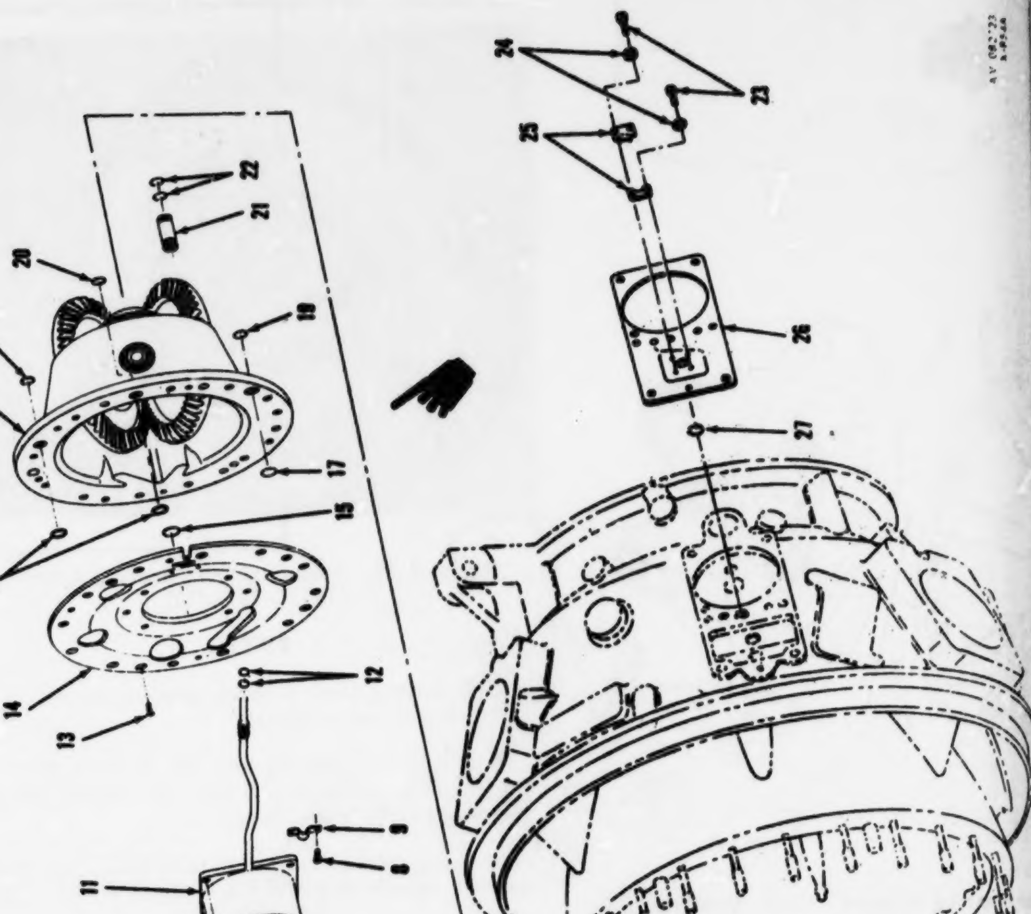
g. Remove nuts (9), bolts (22), and 24 washers (10 and 23) that secure compressor housing assembly upper half to lower half.

h. Remove bolts (5) and washers (4) that secure compressor housing assembly half to impeller housing assembly (1).

i. Using four 1/4-28 bolts, AN-4 or equivalent, as jackscrews, remove compressor housing assembly half.

CAUTION

The impeller housing assemblies have pilot flanges that fit into compressor and diffuser housing assemblies. To prevent damaging flanges during disassembly, always remove compressor housing assembly half before attempting to remove impeller housing assembly.



Key to Figure 3-40.

olt
Washer
ear Bearing Support
ssembly
acking
acking
olt
un Gear Support
ssembly

8. Screw
9. Retaining Strap
10. Bolt
10A. Tabwasher
11. Electric Torquemeter Head Assembly
12. Packing
13. Screw

14. Torquemeter Head Support Assembly
15. Packing
16. Packing
17. Packing
18. Accessory Drive Carrier Assembly
19. Packing

20. Packing
21. Oil Transfer Tube
22. Packing
23. Screw
24. Washer
25. Torquemeter Lockplate
26. Plate
27. Packing

NOTE

ollowing steps j. and k. apply to housing
ith tapered pins.

emove nuts (16) and washers (17) from two
tapered pins (18) on impeller housing.

sing pin removal tool (LTCT4895), remove
pins (18). Tapered pins can also be re-
by threading drive pin punch (LTCT504) onto
acking up impeller housing flange with pin re-
backup tool (LTCT488), and striking punch
mmer.

NOTE

ollowing steps l. and m. apply to housing
ith hollow dowels.

emove nuts (15), washers (19), and bolts (21)
ge of impeller housing assembly (1).

sing mechanical puller (LTCT1218) and slide
r adapter (LTCT6740), remove hollow dowels

n all models except T53-L-701, remove bolts
washers (2) that secure impeller housing as-
to diffuser housing assembly.

n model T53-L-701, remove bolts (3), washers
lts (25) and bushings (24) that secure impeller
assembly to diffuser housing assembly.

NOTE

The ignition unit mounting bracket, attached by three of the bolts that secure upper half of impeller housing assembly to diffuser housing assembly, will be released when these bolts are removed. Index bracket location.

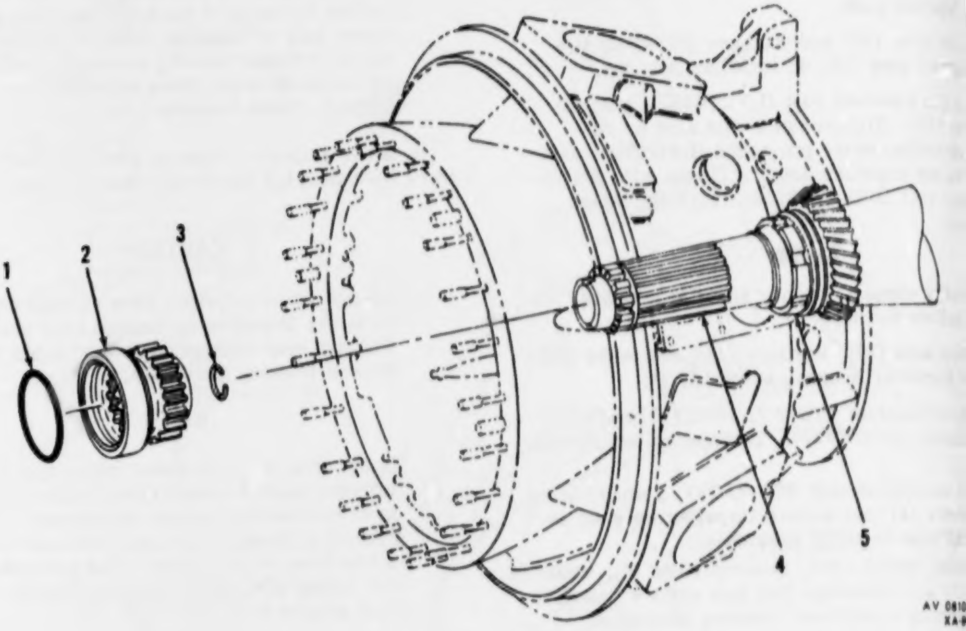
p. Move impeller housing assembly forward toward inlet housing assembly; then lift and remove.

CAUTION

Do not allow impeller housing assembly to strike impeller or compressor blades. Contact may damage blades or inner surface of housing assembly.

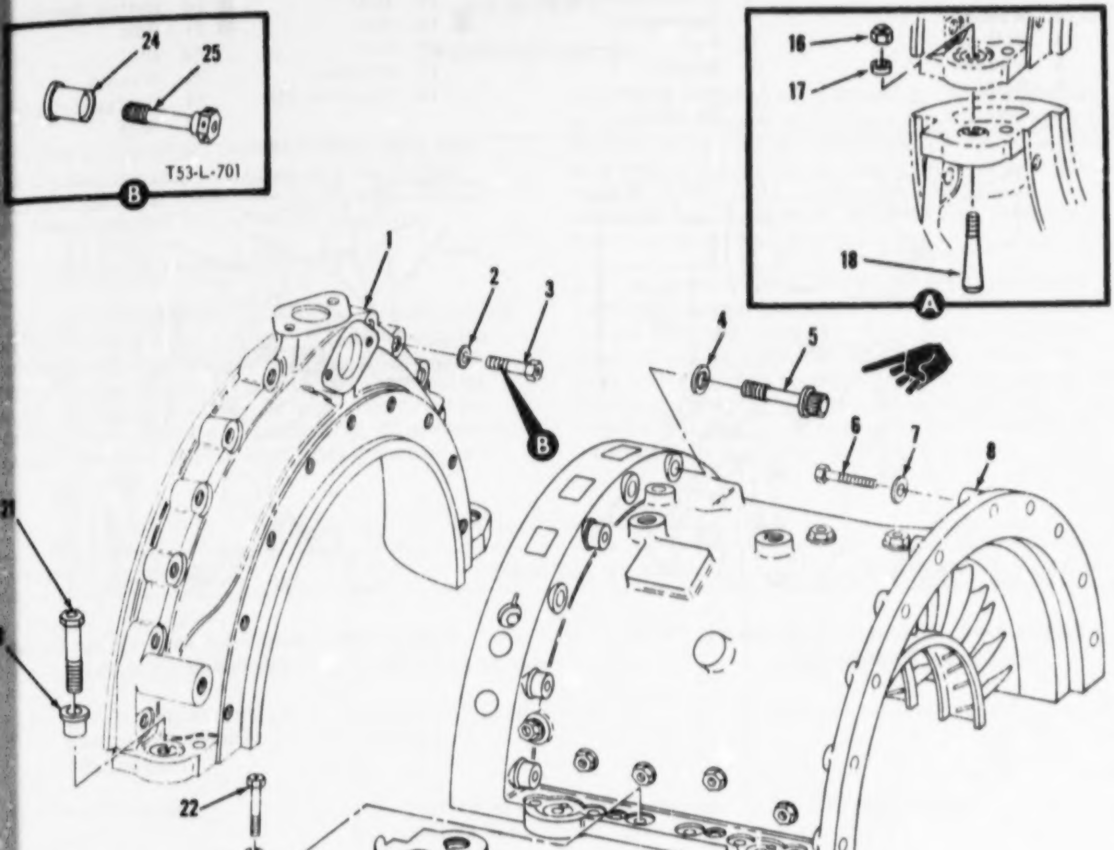
NOTE

Recording of compressor rotor and centrifugal impeller clearance at this time is recommended but not mandatory. The record of these clearances will serve as a checklist at assembly. The procedure for taking clearances is described in paragraphs 9-14 and 9-15.



1. **Packing**
2. **Spur Gear**
3. **Retaining Ring**
4. **Power Shaft**
5. **Nut and Seal Assembly**

Figure 3-40A. Spur Gear and Retaining Ring and Attaching Parts (T53-L-701)


24
25
T53-L-701
B
16
17
18
A
1
2
3
B
4
5
6
7
8
21
20
22
23
A
19
15
14
13
12
11
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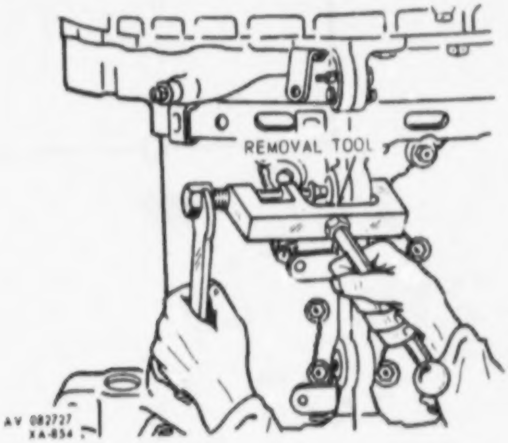
9
AV 082726
X-854A

Figure 3-41. Compressor and Impeller Housing Assemblies and Attaching Parts

Key to Figure 3-41.

1. Impeller Housing Assembly
2. Washer
3. Bolt
4. Washer
5. Bolt
6. Bolt
7. Washer
8. Compressor Housing Assembly
9. Nut
10. Washer
11. Cap Screw
12. Retainer
13. Washer
14. Bolt
15. Nut
16. Nut
17. Washer
18. Tapered Pin
19. Washer
20. Hollow Dowel
21. Bolt
22. Bolt
23. Washer
24. Bushing
25. Bolt


REMOVAL TOOL
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XA-854

Figure 3-42. Removing Tapered Pin Using Removal Tool

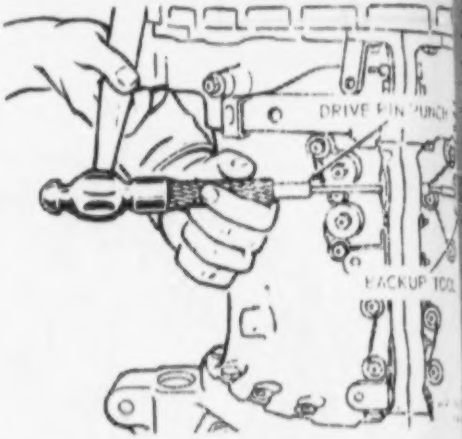

DRIVE PIN PUNCH
BACKUP TOOL

Figure 3-43. Removing Tapered Pin Usi
Pin Punch

CHAPTER 4

TROUBLESHOOTING

GENERAL.

Table 4-1 provides troubleshooting data that aid in discovering, isolating, and correcting ous troubles that may arise in the basic engine ny of its systems during engine operation.

TROUBLESHOOTING.

DISCOVERING THE TROUBLE. Engine trouble be either obvious or hidden. If hidden troubles not detected, serious and considerable damage occur to the engine. Therefore it is essential ve a thorough knowledge of the correct turbine temperature, fuel flow, lubricating oil pressure, other important details of normal engine opera-

4-5. ISOLATING THE TROUBLE. It is essential to have information of previous trouble and work performed on the engine. Check each possible source of trouble until trouble has been isolated by a process of elimination. Systematic checking is essential for thorough troubleshooting. It saves time and promotes accuracy.

4-6. LUBRICATION SYSTEM CONTAMINATION TROUBLESHOOTING PROCEDURE. If an excessive amount of chips are found on the engine oil filter element and/or chip detector, but the reduction gear assembly has freedom of movement and emits no unusual noises, proceed as outlined in following steps a. through k. If contamination is caused by carbon particles, refer to following step l.

Table 4-1. Troubleshooting

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Failure to crank		
a. Low available voltage	Defective battery	Charge or replace battery
b. No aircraft electrical power, or power is intermittent	Faulty aircraft electrical system	Refer to aircraft manual
c. Faulty starter	1. Starter shaft sheared; starter will be heard rotating when energized, but engine will not turn	1. Replace starter
	2. Starter defective: no response when energized	2. Refer to aircraft manual
Failure to crank or difficulty encountered in cranking		
a. Gas producer turbine rotor seized NOTE *Failure to crank, or difficulty encountered in cranking may occur during inflight engine restarting but start normally on the ground.*	1. Turbine nozzle or nozzle flange distorted or turbine tip clearance or runout out-of-limits	1. Remove combustor turbine. (Refer to paragraph 3-44 or 3-50.) Inspect for seizure or rubbing. Check clearance and face runout.
	2. Foreign object damage	2. Repair or replace as necessary.
b. Compressor rotor seized	1. Faulty aircraft-mounted accessories impeding compressor rotation	1. Check aircraft-mounted accessories. Refer to aircraft manual
	2. Rotor icing	2. Duct hot air into inlet housing

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE
2. Failure to crank or difficulty encountered in cranking (Cont)	3. Foreign object damage	3. Remove one-half of sor housing and insp determine cause. (Re paragraph 3-57.) Rep necessary
	4. Compressor rotor rubs on housing	4. Inspect visually
3. Failure to start	**WARNING** Before checking ignition system, disconnect leads from igniter plugs to prevent accidental ignition of explosive fuel mixtures in the engine. Place protective covers over exposed openings	
a. Igniter plugs not firing (No crackling sound heard when starting system is energized)	1. Faulty aircraft electrical system or low battery	1. Refer to aircraft ma
	2. Low input voltage to ignition unit	2. Refer to aircraft ma Replace ignition unit ficient voltage is supp and plugs still do not (Refer to paragraphs and 5-134 for T53-L- engines and paragrap 5-135 and 5-136 for T 15/701 engines.)
	NOTE 14VDC shall be the minimum voltage indicated during cranking	
	3. Faulty igniter plugs	3. Disconnect leads from plugs. Install plugs, known to be good, int assembly and let hang Energize system and for spark. If spark is dent, old plugs were Install serviceable pl (Refer to paragraphs 5- 5-138 for T53-L-7/7A and paragraphs 5-139 for T53-L-15/701 eng
	4. Faulty electrical cable assembly	4. Replace
	5. Faulty ignition lead and coil assembly	5. If corrective action in ing step (3) does not in spark, replace lea coil assembly. (Refer

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Failure to start (Cont)		paragraphs 5-129 and 5-130 for T53-L-7/7A engines and paragraphs 5-131 and 5-132 for T53-L-15/701 engines.)
b. No starting fuel	1. No fuel supply to fuel control	1. Check fuel pressure at fuel control inlet for minimum of 15 psig. If fuel pressure is adequate, proceed with step d.8. If there is insufficient fuel pressure, proceed with following steps d.2. through d.7.
	2. Faulty starting fuel solenoid valve	**CAUTION** Disconnect input lead to ignition unit. 2. Disconnect hose from fuel solenoid to starting manifold at the manifold. Connect extension hose and direct into suitable container. Proceed as follows: a. Energize solenoid valve and motor engine b. If fuel does not flow, replace solenoid valve. (Refer to paragraphs 5-17 and 5-18 for T53-L-7/7A engines and paragraphs 5-19 and 5-20 for T53-L-15/701 engines) c. Reconnect hose assembly to starting fuel manifold
	3. Aircraft fuel gate valve closed	3. Open valve. Refer to aircraft manual
	4. Aircraft fuel boost pump inoperative or no power to starting fuel solenoid valve	4. Refer to aircraft manual
	5. Starting fuel solenoid strainer or lines clogged	5. Clean or replace
c. Low fuel pressure	Fuel control pumps worn	Attach two 0 to 200 psi gages to pump pressure tap ports. Motor engine at 10 to 20 percent N1 speed and check pressures. If pressures do not exceed 100 psig, replace fuel control
d. No main fuel	1. Aircraft fuel gate valve closed	1. Open valve. Refer to aircraft manual
	2. Aircraft fuel boost pump inoperative	2. Refer to aircraft manual
	3. Aircraft fuel filter or lines clogged	3. Replace. (Refer to paragraphs 5-52 and 5-58.)

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
3. Failure to start (Cont)	4. Aircraft fuel boost pump inoperative	4. Refer to aircraft manual
	5. Engine fuel filter clogged	5. Replace. (Refer to paragra 5-52 and 5-58.)
	6. Faulty fuel control	6. Disconnect hose from fuel control 'S' tube. Position a suitable container to catch draining fuel. Proceed as follows: a. Position prop lever to m RPM and power lever to Ground Idle b. Position engine master Sw - On c. Turn on aircraft boost p **CAUTION** Disconnect input lead to ignition unit. d. Motor engine at 10 to 15 percent N1 e. If fuel does not flow, rep fuel control. (Refer to pa graphs 5-79 and 5-80 for T53-L-7/7A engines, par graphs 5-79 and 5-81 for T53-L-15 engines, and pa graphs 5-82 and 5-83 for T53-L-701 engines)
	7. Faulty flow divider and dump valve (T53-L-15/701 engines)	7. Replace. (Refer to paragra 5-40 and 5-41.) **CAUTION** Disconnect input lead to ignition unit.
	8. Fuel control shutoff or dump valve improperly set	8. Disconnect main fuel hose. Motor engine at 10 to 15 pe cent N1 with power lever i ground idle position. If no fuel discharge from main fuel hose, check cockpit to fuel control linkage riggin Reindex topping governor condition lever shaft to fue regulator

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Failure to start (Cont)		
e. Cold weather **NOTE** On T53-L-7/7A engines, use of JP-5 fuel at temperature below 10°F may require using unmetered starting fuel port.	1. Incorrect fuel (T53-L-15/701 engines.) Incorrect fuel or starting fuel port (T53-L-7/7A engines)	1. Ensure that proper fuel is used on T53-L-7/7A engines, and ensure that unmetered starting fuel port is used. (For fuel requirements refer to paragraph 10-28.)
	2. Improper rigging between the cockpit pedestal MIN. R.P.M. detent and fuel control condition lever "Fuel On" position	2. Rerig controls
Excessive time in starting	Probable causes for excessive time in starting will be similar to those for failure to start	Corrective action will be same as for preceding trouble 3
Hung start; N1 speed fails to accelerate beyond approximately 30 percent and exhaust gas temperature rapidly approaches overtemperature limit	Excessive fuel used for start	Use proper starting procedure (Refer to paragraph 10-9.)
Hot start; exhaust gas temperature limits have been exceeded	1. Low battery voltage **NOTE** Battery voltage should be 24.5 VDC prior to start.	1. Charge or replace battery
	2. Improper starting procedures	2. Use proper starting procedure
	3. Starting fuel solenoid valve fails to shut off	3. Check solenoid valve as follows: **CAUTION** Disconnect input lead to ignition unit. a. Disconnect starting fuel solenoid valve. b. Motor engine c. Check to see that fuel does not flow through valve. If fuel flows through valve when shut off, replace valve (Refer to paragraphs 5-17 and 5-18 for T53-L-7/7A engines and paragraphs 5-19 and 5-20 for T53-L-15/701 engines.)
	4. Air inlet obstructed	4. Remove any obstructions
Torching start; flames shoot from exhaust	1. Improper starting procedure; late introduction of starting fuel	1. Use proper starting procedure (Refer to paragraph 10-9)

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
7. Torching start; flames shoot from exhaust (Cont)	2. Accumulation of fuel inside tailpipe or combustion chamber	2. Check lines and combustion chamber drain valve for obstructions **NOTE** Remove combustion chambe drain valve for inspection (Refer to paragraphs 5-42 through 5-45 and 7-97.)
	3. Defective starting fuel solenoid valve, sticking in the open position.	3. Functional test starting fuel solenoid valve (Refer to paragraph 8-54) replace valve assembly if defective.
8. Flame-out during start	Insufficient supply of starting fuel	Check starting fuel nozzles for clogging. Maintain starting fuel longer than on previous start
9. Ground idle speed low with fuel control in ground idle range	1. Linkage between cockpit levers and fuel control not synchronized	1. Synchronize linkage. Refer to aircraft manual
	2. Ground idle speed improperly set on fuel control	2. Adjust idle speed trim as required (Refer to paragraph 5-85 for T53-L-7/7A engines and paragraph 5-86 for T53-L-15/701 engines.)
	3. Fuel flow restricted	3. Check fuel strainers and lines
	4. Selector switch in emergency position (T53-L-7/7A engines)	4. Return to ground idle and position selector switch to automatic
	5. Aircraft selector switch improperly wired or faulty transfer solenoid valve (T53-L-7/7A engines)	5. Check aircraft wiring and correct as necessary Pin A - Emergency Pin B - Common ground Pin C - Automatic Replace switch if necessary Check that resistance of each coil is 17 to 22 ohms Replace solenoid if necessar
10. Ground idle speed high with fuel control in ground idle range	1. Aircraft engine controls improperly rigged	1. Refer to aircraft manual
	2. Ground idle speed improperly set on fuel control	2. Trim fuel control as necessary (Refer to paragraph 5- for T53-L-7/7A engines an paragraph 5-86 for T53-L-15/701 engines.)

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Actual N1 speed higher than computed speed at maximum power lever setting (T53-L-7/7A engines)	1. Error in computation	1. Check the following: a. Calculations b. Ambient temperature c. Proper data sheet for specific engine being run d. Deviation in Regulated Gas Producer Speed vs Compressor Inlet Total Temperature (See figure 5-30.)
	1A. Dirty or eroded compressor or FOD	1A. Inspect. (Refer to paragraph 7-15 and 12-35.)
	2. Fuel control improperly adjusted	2. Adjust (Refer to paragraph 5-85.)
	a. Fuel control power lever travel too great	a. Adjust fuel control power lever stops as necessary. Check N1 speeds and adjust as required
	b. Trim improperly adjusted	b. Trim as necessary
	3. Faulty tachometer system	3. Refer to aircraft manual
	4. Faulty fuel control	4. If fuel control does not respond to adjustments, replace. (Refer to paragraphs 5-79 and 5-80.)
Actual N1 speed lower than computed speed at maximum power lever settings (T53-L-7/7A engines)	1. Error in computation	1. Check. (Refer to preceding Trouble 11.)
	2. Insufficient fuel supply	2. Check for restrictions in all fuel strainers (Refer to paragraph 12-21.)
	3. Insufficient fuel supply to fuel control	3. Proceed as follows:
	a. Engine fuel filter clogged	a. Replace. (Refer to paragraphs 5-52 through 5-58.)
	b. Aircraft fuel gate valve not fully open	b. Open gate valve
	4. Improper fuel control linkage adjustment	4. Install paper or tape on stops. Move throttle to check paper or tape for contact. If no contact is evident, check aircraft rigging. Refer to aircraft manual
	5. Selector switch in emergency position	5. Slowly retard power level to 70 percent N1. Switch to automatic position. Speed should increase
	6. Improper fuel control adjustment	6. Adjust (Refer to paragraph 5-85.)
	7. Faulty indicating system	7. Refer to Trouble 21 and 22
	8. Engine fuel filter element clogged	8. Replace

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTIO
12. Actual N1 speed lower than computed speed at maximum power lever settings (T53-L-7/7A engines) (Cont)	9. Faulty fuel control 10. Faulty topping governor	9. Replace. (Refer to paragraphs 5-79 and 5-80.) 10. Adjust or replace (Refer t paragraph 5-74 and 5-75.)
13. Low N2 speed (T53-L-7/7A engines)	1. Condition lever travel restricted 2. Low N1 speed 3. Faulty topping governor	1. Check aircraft rigging. Re to aircraft manual 2. Refer to preceding Troubl 3. Adjust or replace (Refer t paragraph 5-74 and 5-75.)
14. Overspeed N2	1. Faulty propeller governor 2. Faulty topping governor 3. Faulty fuel control	1. Refer to aircraft manual 2. Adjust or replace. (Refer t paragraph 5-74 or 5-75.) 3. Replace fuel control. (Re to paragraphs 5-79 throug 5-87.)
15. High exhaust gas temperature during starting or steady state operation	1. High setting of N1 speed 2. Air inlet obstructed 2A. Dirty or eroded compressor or FOD 3. External loss of air; hot-air solenoid valve open (engine deicing) NOTE Power failure or open circuit breaker will cause hot-air valve to remain open 4. External loss of air; airframe customer bleed air leakage 5. External loss of air; combustion chamber drain fails to close	1. Adjust (Refer to precedin Trouble 11.) 2. Check for and remove all obstructions 2A. Inspect. (Refer to paragraphs 7-15 and 12-35.) 3. With engine operating, c for flow of hot air from v holes located in forward e gine mounts. If air is evident, valve is open. Check for the following: a. Ensure that circuit breaker is on b. Ensure that hot-air so noid valve switch is i closed position c. Ensure that proper vo age is available at elec trical connector of hot-air valve. Refer to air craft manual d. If the above items hav been checked and valve remains open, replace hot-air valve or solenoid (Refer to paragraphs 5-143 and 5-14 4. Blank off engine customer bleed air; check all piping coupling clamps 5. With engine operating, pl finger over drain port. I is felt, drain valve is ope Repair or replace (Refer t paragraphs 5-42, 7-97 an 5-43 for T53-L-7/7A eng and paragraphs 5-44, 7-97 and 5-45 for T53-L-15/70 engines)

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
5. High exhaust gas temperature during starting or steady state operation (Cont)	6. Low air flow; dirty compressor	6. Clean with drycleaning solvent using specified procedures (Refer to paragraph 7-15.)
	7. Faulty exhaust gas temperature measuring system	7. Check out system. (Refer to paragraph 4-7.)
	8. Internal loss of air. Leaking nozzle sealing rings or no interference fit between combustion chamber liner and gas producer (N1) nozzle curl (T53-L-15/701 engines) leaking power turbine cylinder seal (T53-L-7/7A engines)	8. Remove and inspect combustor turbine (Refer to paragraphs 3-44 and 7-40 for T53-L-7/7A engines, paragraphs 3-50 and 7-54 for T53-L-15/701 engines.)
	9. Internal loss of air; damaged first stage turbine nozzle	9. Remove combustor turbine assembly and inspect. Repair or replace parts as necessary. Refer to preceding step 8.
6. High exhaust gas temperature during acceleration	1. All probable causes that apply to preceding Trouble 15 may apply here	1. Same as for preceding Trouble 15.
	1A. Binding engine-mounted accessories	1A. Replace faulty accessories.
	2. Selector switch in emergency position (T53-L-7/7A engines)	2. Refer to preceding Trouble 9, step 4.
	3. Faulty fuel control	3. Replace fuel control. (Refer to paragraphs 5-79 and 5-80)
7. Fluctuation or no indication of exhaust gas temperature	Faulty indicating system	Check out system. (Refer to paragraph 4-7.)
. Fluctuation in exhaust gas temperature, N1 and N2 speeds, torquemeter pressure, and fuel flow	1. Faulty fuel control	1. Replace. (Refer to paragraphs 5-79 and 5-80 for T53-L-7/7A engines, paragraphs 5-79 and 5-81 for T53-L-15 engines, and 5-82 and 5-83 for T53-L-701 engines.)
	2. Faulty indicating system	2. Refer to aircraft manual.

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTIO
18. Fluctuation in exhaust gas temperature, N1 and N2 speeds, torquemeter pressure, and fuel flow (Cont)	3. Faulty topping governor	3. Replace (Refer to paragr 5-74 and 5-75 for T53-L- 7/7A/15 engines and paragraphs 5-76 and 5-77 for T53-L-701 engines.)
19. Slow acceleration	1. May be same as for preceding Trouble 16	1. Same as for preceding Trouble 16
	2. Faulty fuel control	2. Replace (Refer to paragr 5-79 and 5-80 for T53-L- engines, paragraphs 5-7 5-81 for T53-L-15 engines and 5-82 and 5-83 for T53 701 engines)
20. Engine surge during acceleration	1. Airbleed band not opening during speed transients	1. For T53-L-15/15A/701 engines observe airbleed act ating air during transit to ensure movement. If no movement is observed, pe form bleed band closure c refer to paragraph 5-15 For T53-L-7/7A engines form bleed band closure c refer to paragraph 5-157, check air lines for obstru tions. If this does not so problem replace airbleed actuator. (Refer to paragraph 5-153 and 5-155.) I still not effective replace fuel control. Refer to fol ing step 2.
	1A. Dirty or eroded compressor or FOD	1A. Inspect. (Refer to parag 7-15 and 12-35.)
	2. Faulty fuel control	2. Replace (Refer to paragr 5-78 and 5-80 for T53-L- 7/7A engines, paragrap 5-79 and 5-81 for T53-L- 15A engines, and paragr 5-82 and 5-83 for T53-L- 701 engines.)
	3. Damaged P3 fitting on air diffuser	3. Repair (Refer to paragr 7-39 or replace)
	4. Selector switch in emergency position (T53-L-7/7A engines)	4. Refer to preceding Trou 9, step 4.
	5. Rupture of fuel control temperature-sensing element	5. Inspect tube. (Refer to paragraph 7-107.) Repl fuel control if crack lim are exceeded. (Refer to paragraphs 5-79 through 5-83.)

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
. Engine surge during acceleration (cont)	6. Compressor stalls or engine surge may be contributed to a defective High Temperature Check Valve located in the left and right wing engine manifold duct.	6. Refer to TM55-1510-213-23-3, Fig. 13-25 and 13-26, Items 6 and 44. Check High Temperature Check Valve as follows. Remove plug below the engine shut-off valve (Item 6). Run the opposite engine from which plug was removed. If air escapes from the plug hole, High Temperature Check Valve is defective on the same wing engine in which plug was removed. Replace plug and repeat procedure for opposite engine.
	7. Airbleed band closes during the starting sequence and will not open until engine is shutdown.	7. Check airbleed band closure malfunction as follows: a. Check number four fitting in the P-3 port on the fuel control cover to ascertain that it is unrestricted. b. Disassemble airbleed actuator and check condition of diaphragm. (Refer to paragraph 6-40.)

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
21. Low torquemeter indication (T53-L-7/7A/15 engines)	1. Faulty torquemeter pressure transmitter or indicator	1. Remove torquemeter and acce gearbox pressure lines for tra mitter. Attach direct reading p sure gage to each line. Opera gine and note pressures. Subtr accessory gearbox pressure fr torquemeter pressure and com result with pressure indicated o cockpit gage. If direct gage rea is satisfactory, fault is in trans- mitter or indicator. Replace as necessary
	2. Low N1 speed	2. Refer to preceding Trouble 12
	3. Low power-driven rotary (booster) pump pressure	3. Attach direct reading gage to pr sure port at forward side of ove speed governor and tachometer d assembly. Ensure that torqueme pressure is 140 psi minimum d engine operation at 92% N1 and above. Adjust as required. (Ref to paragraph 5-114.)
	4. Damaged sealing ring **NOTE** This damage may occur upon reassembly after front end inspection. It is recognized at initial run of engine.	4. Remove reduction gear assembly and inspect. Replace damaged p (Refer to paragraphs 3-53 and 1-
	5. Packings on torquemeter relief valve assembly improperly installed or damaged. (Located on overspeed governor and tachometer drive assembly)	5. Remove torquemeter relief valv sembly. Check oil passage for o structions. Replace three packing around relief valve body
	6. Torquemeter oil system passage way on right side of engine inlet housing plugged with foreign matter.	6. Verify condition by attaching a di rect reading gage to check, torque meter boost pump pressure. If torquemeter boost pump is normal and outlet pressure is "O" PSI o very low, the torquemeter oil sys tem passage way on the right side of the engine inlet housing could be obstructed, apply air pressure to outlet port right side of engine housing. If this does not clear ob struction remove reduction gear assembly and apply air pressure to oil passage way to clear ou obstruction.

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
gh torquemeter indi- tion (T53-L-7/7A/15 gines)	**1. Faulty torquemeter pressure transmitter or indicator**	1. Refer to preceding Trouble 21
	2. Torquemeter valve fails to close	2. Remove plug at front of overspeed governor and tachometer drive assembly. Install AN fitting in torquemeter booster pressure port. Apply 100 psi air pressure to fitting. Disconnect pressure line at torquemeter transmitter. No air flow will indicate that valve is functioning properly. If flow is observed, apply 100 psi air to fitting at torquemeter transmitter port on inlet housing. This should free any foreign object and permit valve to close. Apply air pressure alternately to torquemeter booster pump port and torquemeter transmitter port until valve seats properly
	3. High N1 speed (T53-L-7/7A engines)	3. Refer to preceding Trouble 11
Power lever stiff	**1. Faulty linkage**	1. Refer to applicable Airframe Manual
	2. Binding within fuel regulator	2. Disconnect linkage at fuel control regulator power lever arm. Using fish scale, determine force needed to move power lever arm from ground idle position to military power position. This force not to exceed 15 pounds. Move power lever arm from military power position to ground idle position. This force not to exceed 25 pounds. During this test, engine should be motored to provide required rotation and lubrication of fuel control regulator. Force in excess of the above necessitates replacement of fuel control regulator

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTI
23. Torquemeter response slow (T53-L-7 7A 15 engines)	Clogged torquemeter bleed filter	Remove and clean
24. (Deleted)		
25. Rotary (booster) pump leaking oil (T53-L-7/7A/15 engines)	Damaged packings or parts	Replace pump
26. Rotary (booster) pump drive shaft broken (T53-L-7/7A/15 engines)	Pump seizure	Replace pump
27. No oil pressure **CAUTION** Do not operate engine until it is determined that oil pump failure or oil starvation has not occurred.	1. Loose hose connectors 2. Aircraft oil tank empty or oil shutoff valve closed 3. Faulty oil pressure transmitting system 4. Oil pump coupling sheared or worn female spline on oil pump drive shaftgear 5. Oil pump does not prime 6. Pressure relief valve will not close	1. Inspect entire lubrication tem for leaks 2. Fill tanks or open valve 3. Check system using pres source to pressure tap 4. Check pressure transmitti system; if satisfactory, oil pump coupling may be shea or spline on oil pump driv shaftgear may be worn. Re place oil pump for sheared coupling. (Refer to paragr 5-104 and 5-105.) Inspect worn spline of shaftgear. (fer to paragraph 7-110.) oil pump failure or oil sta tion has occurred; check N 2, 3, and 4 bearing scaven lines for evidence of metal chips. Replace parts as re quired and perform oil co tamination inspection. (Re to paragraph 12-25. 5. Replace pump. (Refer to pa graphs 5-104 and 5-105.) 6. Replace oil pump. (Refer t paragraphs 5-104 and 5-10

Pages 4-13 and 4-14 deleted.

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
ow oil pressure	1. Low oil level	1. Ensure that tanks are full
	2. Defective aircraft oil tank	2. Remove oil tank, check weighted pendulum
	3. Faulty oil pressure transmitting system	3. Refer to preceding Trouble 27, step 3.
	4. Power-driven rotary (oil) pump inlet fitting incorrectly installed	4. Install correctly. Fitting should not bottom out
	5. Clogged oil filter or strainers	5. Inspect and, if necessary, clean filter and strainers. For oil strainer information refer to paragraphs 5-99 through 5-101 for T53-L-7/7A engines and paragraphs 5-102 and 5-103 for T53-L-15/701 engines. For oil filter information refer to paragraphs 5-107 through 5-111
	6. Power-driven rotary (oil) pump improperly adjusted	6. Adjust. (Refer to paragraph 5-106.) If pump does not respond to adjustment, replace. (Refer to paragraphs 5-104 and 5-105.)
	7. Power-driven rotary (oil) pump inlet elbow (AN837-12D) improperly installed	7. Check and reinstall
High oil pressure	1. Faulty oil pressure transmitting system	1. Refer to preceding Trouble 27, step 3.
	2. Oil pressure lines restricted	2. Check lines for restrictions
	3. Clogged oil filter. (bypass valve open)	3. Clean filter. (Refer to paragraph 5-109.) For T53-L-15/701 engines check bypass indicator and reset
	4. Power-driven rotary (oil) pump improperly adjusted	4. Adjust. (Refer to paragraph 5-106.) If pump does not respond to adjustment, replace. (Refer to paragraphs 5-104 and 5-105.)
High oil temperature	1. Low oil level in aircraft tank	1. Fill to proper level
	2. Faulty oil cooler	2. Refer to aircraft manual
	3. Restriction in lubrication system	3. Check all lubrication lines for restrictions. Clean oil filter. (Refer to paragraph 5-109.)

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTIO
31. Excessive oil consumption	1. Excessive oil in aircraft oil tank	**CAUTION** In following step 1., if oil tank is over filled, will drain through the engine vent line into th accessory gearbox and also fill the engine sca return line to the tank a level just below the heater. Drain to proper level. Refer to aircraft manual. 1. Check that aircraft oil tan filled only to a point halfw up the bulls eye mark on sight gage.
	2. Leaking seals, fittings, and lines	2. Tighten or replace fittings seals, or lines
	3. No. 1 main bearing seal leaking	3. Check for indications of o leakage on air inlet vanes, compressor bleed band bo or mating surfaces of compressor housing. If leakage is evident, engine shall be forwarded to overhaul for seal replacement
	4. No. 3 main bearing seal leaking	4. Check for smoke from tai pipe and oil stains on rear of power turbine disc. Rep ment of No. 3 bearing seal required if such indication are evident
	5. Pressure and scavenge tubes not seated in bearing housing	5. Tighten or replace tubes
	6. No. 2 bearing aft seal leaking	6. Check for oil venting over from tank vent, smoke fro pipe, and oil stains on the ward face of the first gas ducer (first stage turbine and curl. Replacement of is necessary if such indic are evident **NOTE** In following step 6A., forward seal may not b replaced on T53-L-7/ engines.

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive oil consumption (Cont)	**6A. No. 2 bearing forward seal leaking**	6A. Check for oil stains on mating flanges of the diffuser housing and the combustion chamber housing assemblies. Check for oil fumes from customer airbleed port. Replacement of seal is necessary if such indications are evident.
	7. Cracked pressure or scavenge oil tubes in diffuser housing	7. Indications are same as preceding step 6. Brazing of tubes will be required
	8. Propeller shaft seal leaking	8. Replace seal. (Refer to paragraph 6-24 and 8-61.)
Oil appearing at splitline and bleed band, but oil consumption not excessive **NOTE** **Oil fumes can enter the cockpit through the heating and air conditioning system.**	**1. Seal leakage at the customer (western gearbox) power takeoff pad**	1. Remove western gearbox and check integrity of seal
	2. N2 tachometer drive gearbox seals leaking into anti-icing cavity	2. Remove N2 tachometer and overspeed governor drive gearbox to check integrity of seal
	3. No. 1 main bearing seal or No. 2 forward seal leaking	3. These remedies discussed under Trouble 31
Engine fails to shut off	**Faulty linkage**	Refer to aircraft manual
Coastdown time of N1 too short	**Internal binding**	**CAUTION** **Disconnect input lead to ignition unit.** **Motor engine and check for noise and binding. (Refer to preceding Trouble 2.)**

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTIO
34. Actual torque higher or lower than expected at maximum power lever setting (T53-L-15/701 engines)	1. Error in computation	1. Recompute
	2. Improper fuel control linkage adjustment	2. Install paper on fuel control stop(s), with engine static. Mov cockpit power lever to check fo contact. As final check, install masking tape over fuel control stop(s), then run engine to co stops(s). If no positive contact i evident, on tape, check aircraft rigging. Refer to aircraft ma
	3. Insufficient fuel supply	3. Check for restrictions in all fu strainers. (Refer to paragrap 12-21.)
	4. Faulty indication system	4. Refer to preceding Trouble 24 to aircraft manual
	5. Engine fuel filter element clogged	5. Replace
	6. Faulty fuel control	6. Replace. (Refer to paragraphs 5-82 and 5-83.)
	7. Internal air leakage accompanied by high exhaust gas temperature	7. Refer to previous Trouble 15
35. Actual torque lower than expected at maximum power lever setting (T53-L-15 engine)	1. Faulty torque limiter	1. Replace torque limiter. (Refer to paragraphs 5-63 and 5-64.)
	2. Faulty fuel control	2. Replace fuel control. (Refer t paragraphs 5-79 and 5-81.)

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Electric torquemeter system, fault indication (T53-L-701 Series Engines)	**NOTE** The recommended method for troubleshooting the electric torquemeter system is with the use of the electric torquemeter comparator test set (LTCT 13608) on the flight line. This comparator provides a means of systematically isolating the torquemeter fault to either the engine torquemeter kit or to a specific airframe component. Isolation of the fault to a specific component of the engine torquemeter kit is not necessary since the only corrective action is to remove and replace the entire kit at depot. This method of troubleshooting is recommended since it evaluates the torquemeter system dynamically with electrical power applied to the system and the engine operating at power. When the electric torquemeter comparator test set (LTCT13608) is not available, the following procedures, 37 through 39, may be used to troubleshoot the system. This is a static nonfunctional check. (See figure 4-1.)	
Torquemeter indicator perates sluggishly or ith suspected false indi- ation	1. Low dc input to power supply	1. Remove dc input connector from power supply. Close battery relay circuit breaker and check for 21 to 30 vdc at dc input connector. If voltage is not present check dc power source at nose wheel well test jacks. DC voltage shall be 21 to 30 vdc.
	2. Faulty power supply	2. Replace power supply
	3. Faulty indicator	3. Replace defective indicator
orquemeter indicator inter does not drop low 13 psi with elec- cal power ON and gines stopped	1. Indicator not zeroed correctly	1. Zero indicator pointer. (Refer to paragraph 5-128A.) If indicator cannot be zeroed, replace indicator and repeat zeroing procedure
torque indication with ctrical power ON and gine operating. OFF g present	1. Faulty indicator	1. With the engine static, the power supply circuit breaker ON, the battery relay circuit breaker ON, and the battery switch in Normal position, remove the female connector at the rear of the cockpit indicator. Using a dc voltmeter, place positive (+) lead to receptacle U and ground (-) lead to receptacle F on the connector. If dc voltage is present, replace cockpit indicator

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
39. No torque indication with electrical power ON and engine operating. OFF flag present (Cont)	2. Faulty power supply	2. With the engine static, disc female output power supply c tor. Set cockpit power supply cuit breaker to ON, cockpit b relay circuit breaker ON and the battery cockpit switch in Normal position. Using a dc meter, place positive (+) lea pin A and negative (-) lead to B at male pins of power su put jack. There should be a between 21 and 30 vdc. If re not within limits, replace the supply. Using ac ammeter, p probes across pins C and D. appropriate meter scale, rec the current. It should be app mately 0.5 amperes
	3. Open circuit in primary wiring between head assembly and power supply	3. With engine static, disconne male output power supply co Pull out the cockpit battery r circuit breaker and cockpit p supply circuit breaker. Chec continuity between connector ceptacles A and B. If there i continuity, break down the w route as follows: (1) Disconnect the engine ele harness from engine junc (2) Check for continuity betw tion box pins A and B. If co exists, then the open exis airframe wiring. Repair quired. If there is no co ship engine to Depot for r ment of torquemeter kit.
	4. Open circuit in common wiring from engine junction box to cockpit indicator	4. With the engine static, pull cockpit battery relay. Remo nectors from both the engine tion box output and the rear cockpit indicator. Check co by placing one probe at junc receptacle A and the other p cockpit receptacle A. Repea receptacle B and C at both ends. Repair as required
	5. Defective torquemeter kit	5. Ship engine to Depot for re of torquemeter kit.
40. Erratic bleed band operation	1. Improperly adjusted	1. Adjust. (Refer to paragrap If bleed band does not resp justment, refer to following through 4.

Table 4-1. Troubleshooting (Cont)

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
. Erratic bleed band operation (Cont)	2. Clogged strainer element	2. Clean strainer. (Refer to table 7-1.)
	3. Ruptured diaphragm	3. Replace diaphragm. (Refer to paragraphs 6-39, 6-40, 8-19, and 8-21.)
	4. Faulty fuel control	4. Replace fuel control. (Refer to paragraphs 5-79 through 5-83.)
. Evidence of oil leakage on air inlet vanes, compressor bleed band holes or mating surfaces of compressor housing. NOTE Oil fumes can enter the cockpit through the heating and air conditioning system	1. No. 1 main bearing seal leaking.	1. If leakage is evident, engine shall be forwarded to overhaul for seal replacement

WARNING

Prolonged contact with lubricating oil (item 63 or 64, table 2-2) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Areas in which lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.

CAUTION

Lubricating oil (item 63 or 64, table 2-2) may soften paint upon contact. If lubricating oil is spilled on painted surfaces, these surfaces should be thoroughly washed.

a. Remove chips from oil filter elements and retain for analysis. Clean filter elements and reinstall.

b. Drain all oil from accessory drive gearbox and airframe oil tank and oil cooler.

c. Remove chips, if any, from chip detector and retain for analysis. Clean chip detector and reinstall.

d. Remove and inspect No. 2 bearing strainer and No. 3 and 4 bearing strainer (strainer bore on T53-L-15/701 engines) for metal chips. (Refer to paragraph 12-27.) If chips are present, remove and inspect overspeed governor and tachometer drive oil throttle strainer. Remove, inspect, and clean accessory takeoff pad strainer which supplies Western gearbox. Ship engine to depot maintenance if metal chips have clogged more than one third of the flow area of any one of the previously mentioned strainers. If amount of chips is not excessive, clean and reinstall strainers and proceed to following step f.

e. Presence of chips in previously mentioned strainers indicates bypass of oil filter has occurred. Replace oil filter.

(1) through (6) (Deleted)

f. Disconnect scavenge hose assemblies for No. 2, 3 and 4 bearings and determine if residual oil in hose assemblies is contaminated with chips. If so, replace affected bearing.

g. For T53-L-7/7A engines, if oil in No. 2 bearing scavenge hose is contaminated with chips, ship engine to depot maintenance.

h. Refill oil tank to capacity with new lubricating oil (item 63 or 64, table 2-2).

CAUTION

Any fluctuation in oil pressure in excess of plus or minus 5 psi, or rapid rise in oil temperature at any pre-set power setting, is cause for immediate engine shutdown.

i. Start engine. Run engine at flight idle un
temperatures have stabilized. Check instrumen
proper engine operation. Increase speed to 80 p
cent N1 and maintain for 5 minutes.

j. Shut down engine and again inspect oil fil
elements, chip detector, and strainers.

NOTE

Chips in filter may come from oil supply tank; chips on chip detector from engine.

k. If quantity of chips still remains the sam
second engine run, do not clean filter, strainers,
chip detector. Ship engine to depot maintenance.
Flush all airframe mounted engine oil lines.

NOTE

Ship oil tank and oil cooler to higher maintenance level as directed by airframe manual.

l. If amount of carbon particles found on en
oil filter element is in excess of that shown in f
4-2, proceed as follows:

(1) Clean and reinstall oil filter assembly.

(2) Drain all oil from accessory drive ge
oil tank, and oil cooler.

(3) Remove and inspect No. 2 bearing and
and 4 bearing oil strainers (strainer bores on T
L-701 engines). If carbon particles are present,
filter has been bypassed. Remove, clean, and re-
install overspeed governor and tachometer driv
throttle strainer. Clean and reinstall No. 2, 3, a
bearing strainers.

(4) Remove and inspect accessory takeoff
strainer. Clean strainer using drycleaning solv
(item 28, table 2-2) and reinstall.

(5) Perform preceding step e.

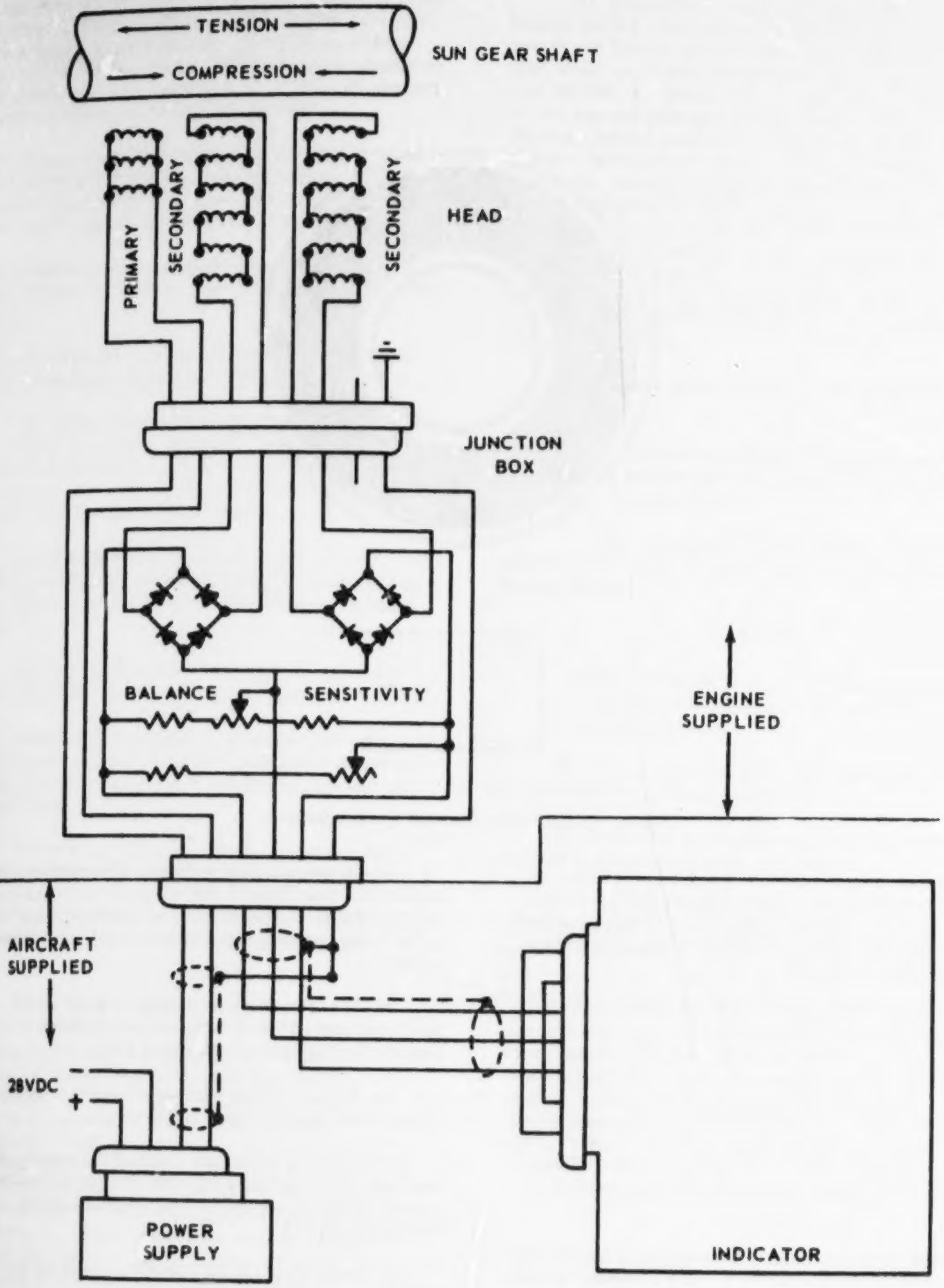
(6) Replenish oil system.

(7) Start engine and operate at 70 to 80 p
N1 for 15 minutes.

(8) Shut down engine; remove, inspect, an
clean oil filter and strainers. Reinstall filter a
strainers.

(9) If contamination is excessive, repeat
cedure until filter is clean after run.

**4-7. EXHAUST THERMOCOUPLE ASSEMBLY
TROUBLESHOOTING PROCEDURE.** This trou
ing procedure applies to exhaust thermocouple
assemblies installed on the engine and the eng
stalled in the airframe. This procedure must
complished whenever exhaust thermocouple s
system accuracy is questionable, whenever a
haust thermocouple is replaced, whenever a


TENSION
COMPRESSION
SUN GEAR SHAFT
PRIMARY
SECONDARY
SECONDARY
HEAD
JUNCTION BOX
BALANCE
SENSITIVITY
ENGINE SUPPLIED
AIRCRAFT SUPPLIED
28VDC
-
+
POWER SUPPLY
INDICATOR

AV 083494
XA-854B

Figure 4-1. Electric Torquemeter System Schematic (T53-L-701) (Typical)

l analyzer for a check of complete system (cock- dicator, airframe wiring, and engine harness). nce actual temperature by rheostat on Jetcal zer to 600°C and allow temperature to stabilize. pit indicator shall read 600°C ± 5°C. If reading within limits, proceed as follows:

(1) Check each individual thermocouple to en- that all thermocouples are operative. As heat plied to each thermocouple, the airframe EGT ator must show a temperature rise.

(1A) Perform a cockpit EGT indicator check. r to applicable airframe manual and TM55-4920- 4.)

(2) Perform an engine exhaust thermocouple bly resistance check as follows:

(a) Disconnect engine harness from airframe at engine/airframe firewall. Set range scale of meter AN/USM223) or equivalent to either 0.0 ohms or 1.0 to 5.0 ohms. Insert probes of meter into engine harness jacks.

(b) If engine harness resistance is not with- its at particular ambient soak temperature as in figure 4-4, replace thermocouple harness bly.

(c) Reconnect thermocouple harness as- y to airframe leads at engine/airframe firewall.

3) Perform a resistance check of the complete ircuit and adjust variable resistance spool as ed. (Refer to applicable airframe manual and 4920-244-14.)

4) Connect and operate Jetcal analyzer for a te system check. (Refer to preceding step b.)

or T53-L-15/701 engines incorporating the be harness (1-300-177-02), proceed as :

NOTE

ome 6-probe harnesses are not dimen- onally compatible with existing heater ements. In order to perform a heater eck of the EGT system, the heater ements require a support clip to be at- ched. Instructions for fabricating and taching this support clip are contained Appendix C. With the support clip at- ched, the heater elements will not slip f of the thermocouple probes. Future odels of the thermocouple harness (1- 0-177-02) will have modified probes, mpatible with the heater elements. All the thermocouple configurations shown figure 4-5 will have the same part mber; i.e. 1-300-177-02.

(1) If modified harness is installed, install three heater probe assemblies (BH7434R-40) (right side) and three heater probe assemblies (BH7434L-40) (left side) on thermocouple probes. Connect junction box (BH361-8, BH361-10, or BH361-12) to heater probe assemblies and Jetcal analyzer (BH112JA-36). Operate Jetcal analyzer for a check of complete system (cockpit indicator, airframe wiring and engine harness). Advance actual temperature by rheostat on Jetcal analyzer to 600°C and allow temperature to stabilize. Cockpit indicator shall read 600°C ± 5°C. If reading is not within limits, perform following steps (1A) through (5). If an unmodified harness is installed, steps (1A) through (5) must be accomplished to ensure proper function of the engine thermocouple assembly system.

(1A) Determine that all thermocouples are operative.

(a) For unmodified harnesses, apply an external heat source such as a soldering iron to each individual thermocouple.

(b) For modified harnesses, use Jetcal heater probe assembly to heat each individual thermocouple.

NOTE

As heat is applied to each thermocouple, the airframe EGT indicator must show a temperature rise.

(2) Perform a cockpit indicator check. (Refer to applicable airframe manual.)

(3) Perform an engine exhaust thermocouple assembly resistance check as follows:

(a) Disconnect engine harness from airframe leads at engine/airframe firewall. Set range scale of multimeter (AN/USM223) or equivalent to either 0.0 to 1.0 ohms or 1.0 to 5.0 ohms. Insert probes of multimeter into engine harness jacks.

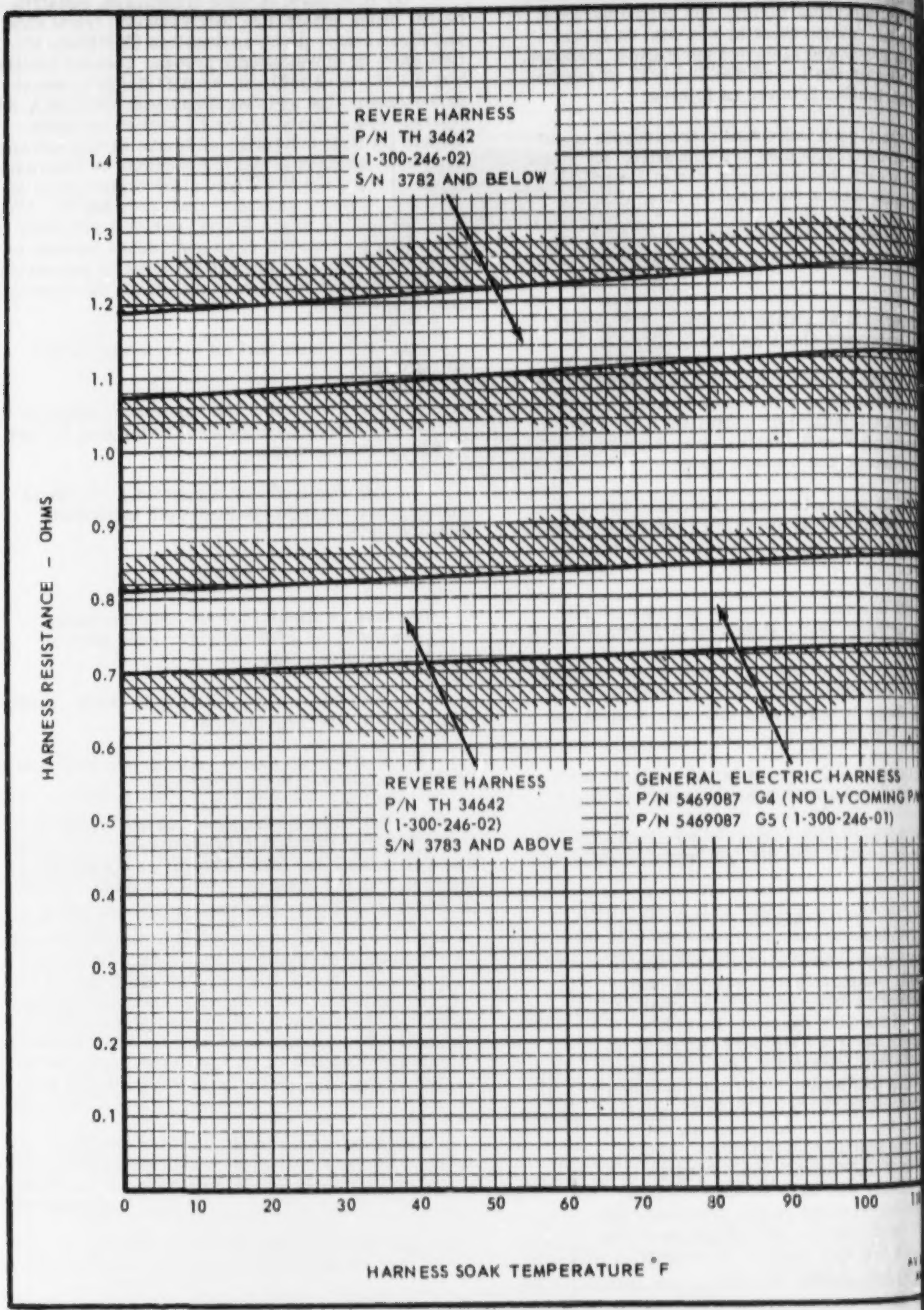


Figure 4-3. Harness Soak Temperature/Resistance (T53-L-7/7A)

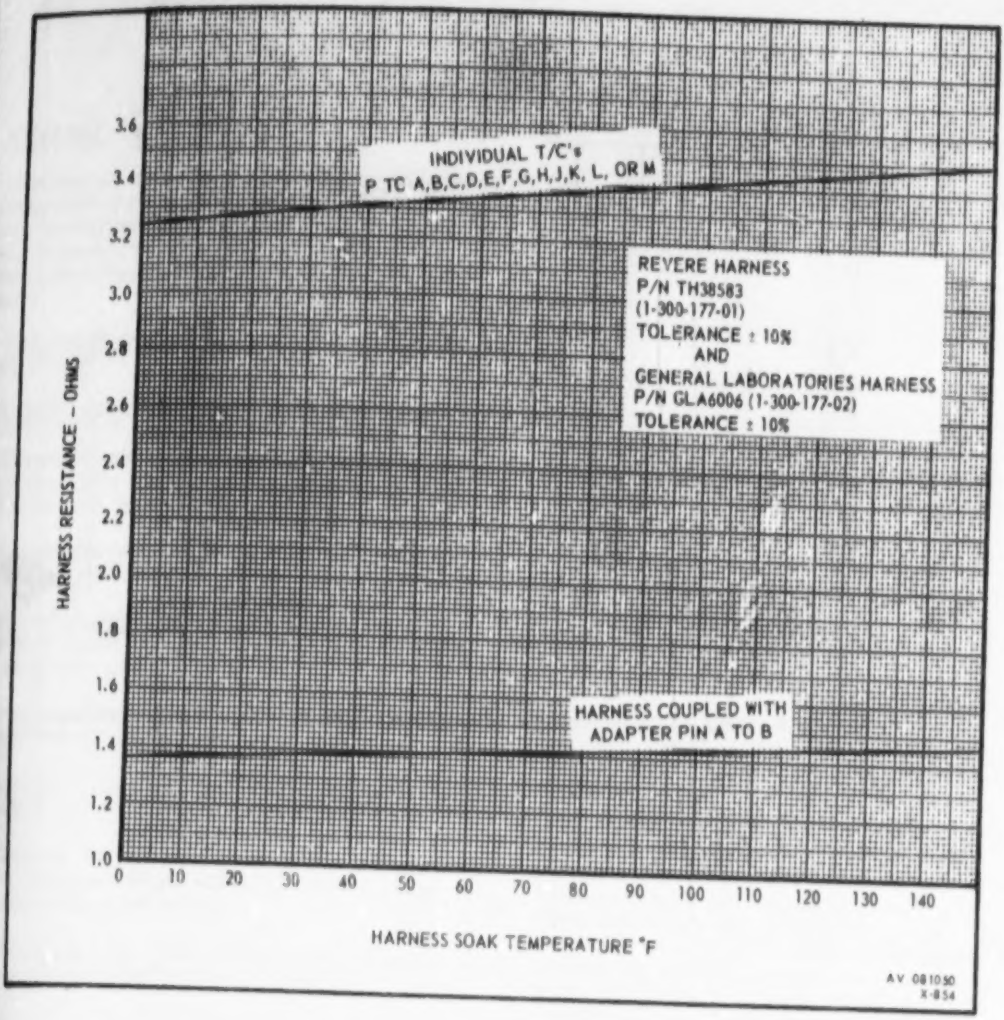


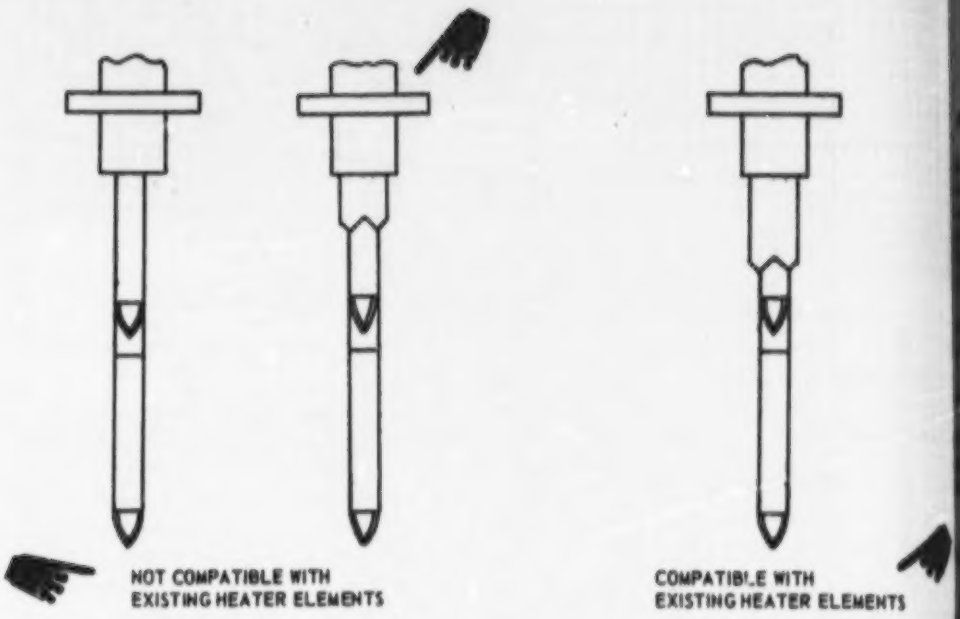
Figure 4-4. Harness Soak Temperature/Resistance (T53-L-15/701)

(b) If engine harness resistance is not within at particular ambient soak temperature as in figure 4-4, replace thermocouple harness ly.

(c) Reconnect thermocouple harness as- to airframe leads at engine/airframe firewall.

(4) Perform a resistance check of the complete EGT circuit and adjust airframe variable resistance spool as required. (Refer to applicable airframe manual and TM 55-4920-244-14.)

(5) For modified harness, connect and operate Jetcal-analyzer for a complete system check. (Refer to preceding step c. (1).)



NOT COMPATIBLE WITH
EXISTING HEATER ELEMENTS
COMPATIBLE WITH
EXISTING HEATER ELEMENTS

Figure 4-5. Exhaust Thermocouple Assembly (1-300-177-02) - Configurations

CHAPTER 5

ACCESSORIES SERVICING

GENERAL.

This section contains instructions for removal installation of engine accessories. Also included general precautionary information, certain stand- maintenance practices. Instructions for cleaning, ction, and repair, of accessories are given in pter 7.

PRECAUTIONS. Refer to Chapter 3, Section II, graph 3-31.

LUBRICANTS AND SEALING COMPOUNDS.

Unless instructions recommend the use of spe- compounds for a particular installation, only the wing shall be used during assembly:

Petrolatum (item 87, table 2-2) for lubricating ystem packing rings.

Hydrogenated vegetable shortening (item 95, 2-2) or castor oil (item 13, table 2-2) for lubri- oil system packing rings.

Pneumatic system grease (item 53, table 2-2) bricating pneumatic system packing rings.

Lubriplate (item 67, table 2-2) for low-tempera- pplications other than packing rings.

Ease-Off 990 (item 32, table 2-2) or Molykote ize thread compound (item 78, table 2-2) for emperature applications.

Molybdenum disulfide powder (item 76, table s an alternate for antiseize compound.

CAUTION

Plastilube Moly No. 3 and Multi-Fax EP2 are incompatible with engine oil. Do not apply either of these lubricants to internal or combustor turbine splines. Do not intermix these lubricants.

Plastilube Moly No. 3 (item 88, table 2-2) for ng external splines both male and female:

(1) Topping governor to fuel control shaft.

(2) Starter drive.

(3) Tachometer drives.

NOTE

When accessory drive gearbox (1-080-250-13) (incorporates oil lubricated fuel control drive splines) (T53-L-7/7A engines) is installed, do not use Plastilube Moly No. 3 or Multi-Fax on splines of fuel control drive shaft and accessory drive gearbox fuel control drive shaftgear.

(4) Accessory drive gearbox fuel control drive (T53-L-7/7A engines).

h. Multi-Fax EP2 (item 79, table 2-2) as an alternate for Plastilube Moly No. 3.

5-6. LOCKWIRING.

5-7. Lockwiring is a method of tying two or more installed parts together to prevent loosening. Unless assembly instructions recommended special safetying methods, the following general practice shall be used.

a. Corrosion-resistant steel lockwire, Military Standard MS20995C20 or MS20995C32, eight twists to the inch, is recommended for use throughout engine assembly unless otherwise noted. (Refer to TM55-1500-204-25/1.)

b. Be certain that parts are tightened to the correct torque and wire passages are parallel. If parts cannot be positioned properly within specified torque limits, replace parts until the required positions are obtained.

5-8. Be certain that the holes of the parts to be lockwired are parallel (step 1, figure 5-1). Always install lockwire to tighten and keep parts in place. Pull and twist lockwire tightly to prevent excessive vibration or rubbing. During lockwiring procedure, do not loosen or tighten parts to manipulate wire. Lockwiring applications are shown in figure 5-2. When lockwiring is completed, allow at least three complete turns of wire to remain before cutting the excess wire.

5-9. When parts have been tightened to the proper torque, positioned, and inspected, use the following procedure.

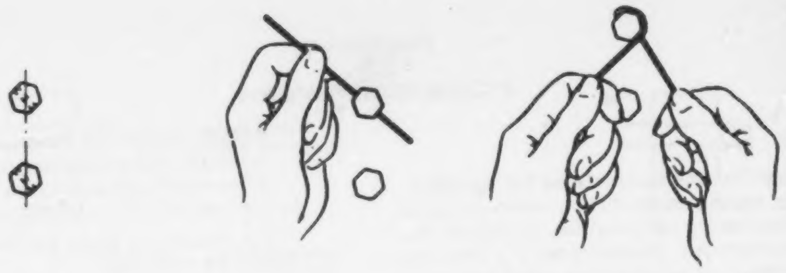
a. Insert wire through hole in first bolt (step 2, figure 5-1).

b. Bend wire to the right around the head of the bolt and under the other end of the lockwire. Tighten wire around head of bolt (step 3).

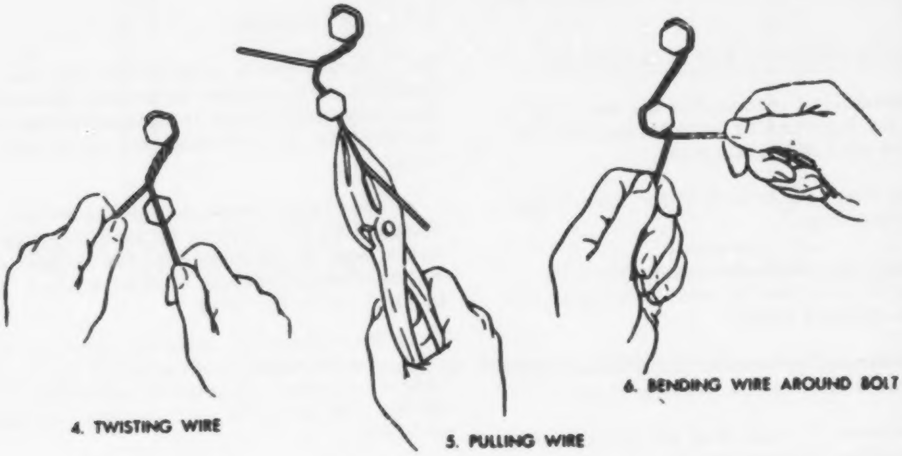
c. Keeping wire tight around head of first bolt, twist wire strands around each other until twisted length is just short of hole in second bolt (step 4).

d. Insert one end of the wire through the hole in the second bolt and pull with pliers (step 5) until tight.

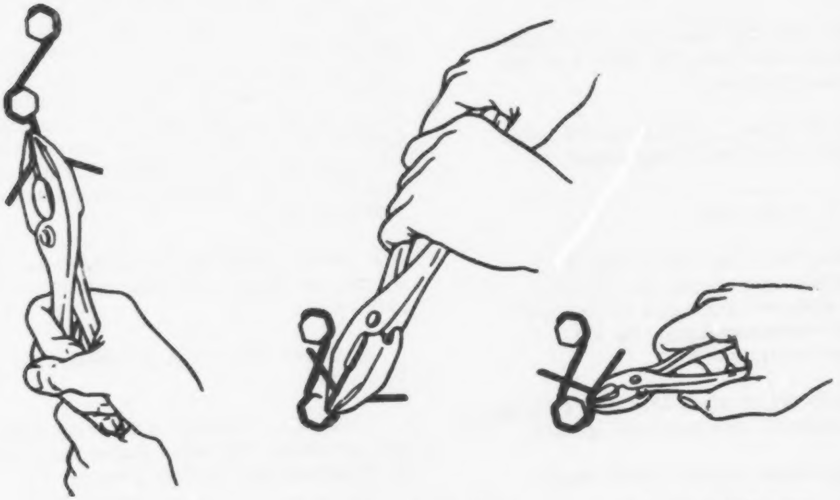
e. Bring other end of the wire around head of bolt and under lockwire protruding from bolt (step 6).



1. LOCKWIRE HOLES PARALLEL 2. INSERTING WIRE 3. BENDING WIRE AROUND BOLT



4. TWISTING WIRE 5. PULLING WIRE 6. BENDING WIRE AROUND BOLT



7. TWISTING WIRE 8. BENDING TWISTED WIRE 9. CUTTING EXCESS WIRE

Figure 5-1. Lockwiring Procedure

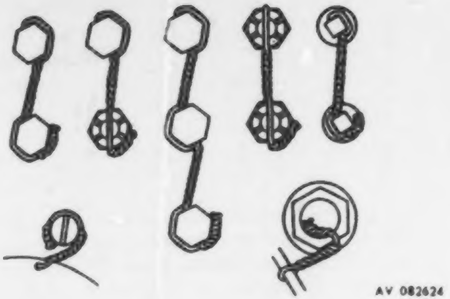


Figure 5-2. Lockwiring Applications

. Keeping wire tight, twist ends together (step 7). ing final twist, bend twisted wire down and around of bolt (step 8).

. Cut off excess wire. Bend sharp ends in toward ne (step 9).

10. TORQUE VALUES.

. When no special torque values are given in a sembly procedure, standard torque values shall ly. Standard torque values are specified in table .

. REMOVAL, INSTALLATION, AND MINOR VICING OF ENGINE ACCESSORIES.

. REMOVAL OF STARTING FUEL HOSES (T53- /7A Engines). (See figure 5-3.) Proceed as ws:

WARNING

Ensure that all electrical power is disconnected.

. Remove screw (12) and nut (8) that secure start- uel hose assembly (11) to engine. Disconnect ing fuel hose connector (13) from starting fuel oid valve (14) and connector (10) from starting manifold. Remove starting fuel hose assembly. and identify all connectors and cap all openings ediately.

. Disconnect primer fuel hose (2) at main fuel rol connector (21) and at elbow (4). Remove w (19) and nut (1) that secure primer fuel hose gine. Remove primer fuel hose.

. INSTALLATION OF STARTING FUEL HOSES -L-7/7A Engines). (See figure 5-3.) Proceed llows:

. Connect starting fuel hose assembly (11) to ing fuel solenoid valve (14) and at starting fuel fold. Secure clamp (9) to bracket with screw nd nut (8).

b. Connect primer fuel hose (2) to main fuel control and to elbow (4) installed in starting fuel solenoid valve. Secure clamp (20) to bracket and to wiring harness lead with screw (19) and nut (1).

5-15. REMOVAL OF STARTING FUEL HOSES AND CHECK FILTER VALVE (T53-L-15/701 Engines). (See figure 5-4.) Proceed as follows:

a. Disconnect starting fuel hose assembly (15) from elbow on fuel control and elbow (11) on solenoid valve (7). Remove elbow (11), gasket (10), and nut (9) from solenoid valve (7).

b. Remove screw (20) from clamp (19).

c. Remove screw (6) and nut (16) that secures clamp (18) to bracket (17).

d. Disconnect starting fuel hose assembly (1) from check filter valve (5), from solenoid valve (7), and from starting fuel manifold. Remove hose assembly.

e. Remove bolt (3) and gaskets (4) from boss on combustor housing. Discard gaskets.

f. Disconnect tube assembly (2) from check filter valve (5). Remove tube assembly.

g. Loosen nut and screw on bracket and clamp assembly that secures check filter valve (5) and remove check filter valve.

5-16. INSTALLATION OF STARTING FUEL HOSES AND CHECK FILTER VALVE (T53-L-15/701 Engines). (See figure 5-4.) Proceed as follows:

a. Position nut (9) and gasket (10) on elbow (11) and install into solenoid valve (7). Connect starting fuel hose assembly (15) to elbow (11) and elbow on fuel control.

b. Connect starting fuel hose assembly (1) to solenoid valve (7) and starting fuel manifold.

c. Secure clamp (18) to bracket (17) at forward face of diffuser housing with screw (6) and nut (16).

d. Secure clamp (19) to combustion chamber housing with screw (20).

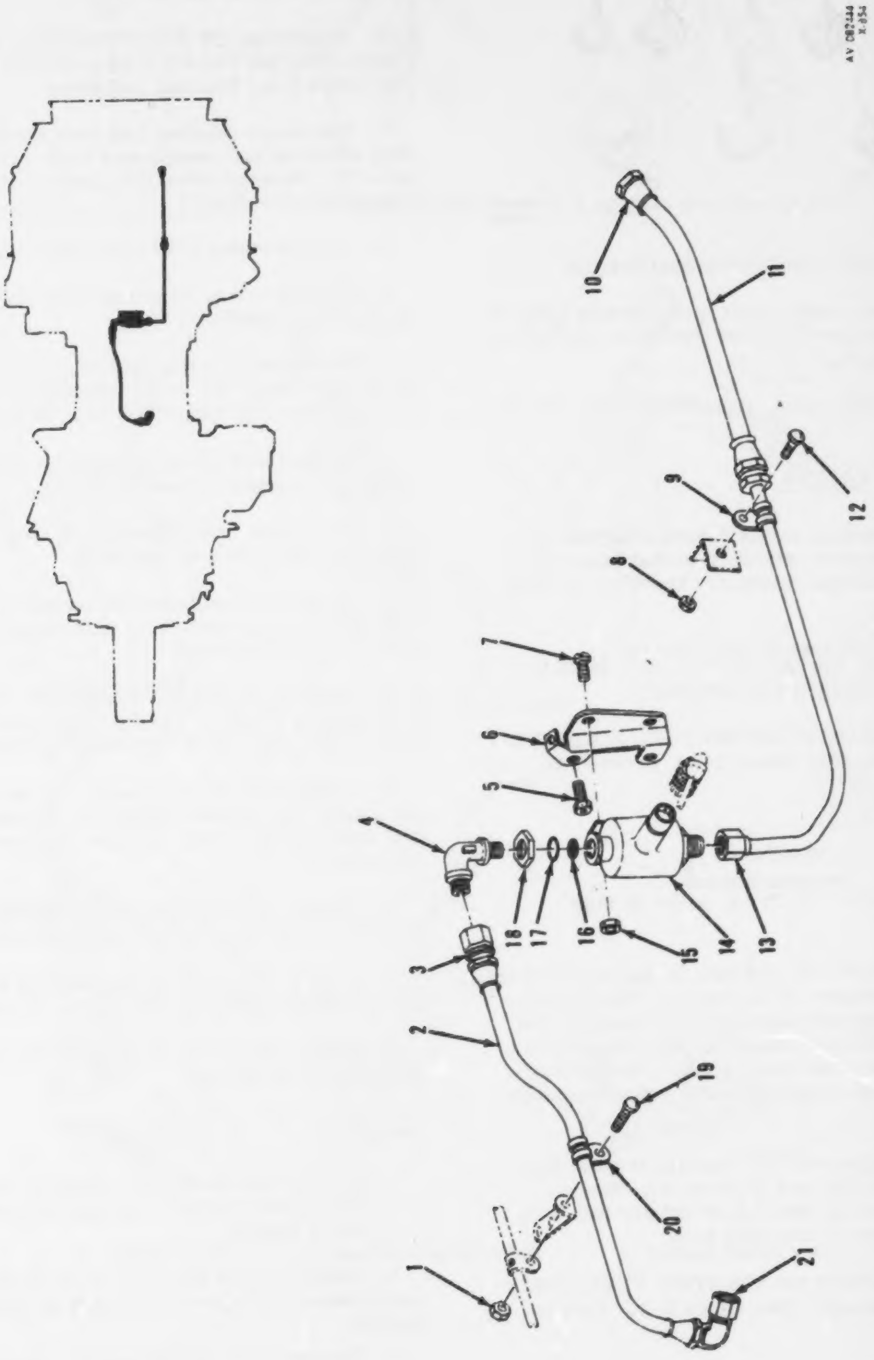
CAUTION

Ensure that check filter valve is installed so that arrow on valve points toward top of engine.

e. Position check filter valve (5) in bracket and clamp assembly on forward flange of combustor housing.

f. Connect valve to starting fuel hose assembly (1).

g. Secure valve to bracket and clamp assembly with screw and nut.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Key to Figure 5-3.

Nut
Primer Fuel Hose
Connector
Elbow
Bolt
Bracket
Screw

8. Nut
9. Clamp
10. Connector (to Starting Fuel Manifold)
11. Starting Fuel Hose Assembly
12. Screw
13. Starting Fuel Hose Connector
14. Starting Fuel Solenoid Valve

15. Nut
16. Screen
17. Packing
18. Nut
19. Screw
20. Clamp
21. Main Fuel Control Connector

. Secure tube assembly (2) to boss on combustor
ing with bolt (3) and gaskets (4). Tighten bolt as
uired. (Refer to table 11-3, reference number 94.)
kwire bolt.

A. REMOVAL OF BRACKET AND CLAMP
EMBLY (T53-L-15/701 Engines).(See figure
A.) Proceed as follows:

. Remove nut (3) and bolt (1) that secure bracket
clamp assembly.

. Remove bracket and clamp assembly (2 or 4)
n combustion chamber housing.

B. INSTALLATION OF BRACKET AND CLAMP
EMBLY (T53-L-15/701 Engines). (See figure
A.) Proceed as follows:

. Position bracket and clamp assembly (2 or 4)
lange of combustion chamber housing.

. Install bolt (1) and secure with nut (3).

7. REMOVAL OF STARTING FUEL SOLENOID
LVE (T53-L-7/7A Engines). (See figure 5-3.)
ceed as follows:

WARNING

Make certain that all electrical power is disconnected.

. Remove electrical connector from starting fuel
noid valve (14).

. Disconnect primer fuel hose (2) and starting
hose assembly (11).

. Remove elbow (4).

. Remove screws (7) and nuts (15) that secure
noid valve to bracket (6), and remove solenoid
e.

. If necessary, remove bracket from compressor
ing by removing bolts (5).

. INSTALLATION OF STARTING FUEL SOLE-
VALVE (T53-L-7/7A Engines). (See figure 5-3.)
ceed as follows:

. If removed, secure bracket (6) to compressor
ing with bolts (5). Lockwire bolts.

b. Position starting fuel solenoid valve (14) on mounting bracket.

c. Secure valve with screws (7) and nuts (15).

d. Install elbow (4) in inlet port and connect primer fuel hose (2) to elbow.

e. Connect starting fuel hose assembly (11) to fitting on solenoid valve outlet port.

f. Connect electrical connector to valve. Lockwire connector.

5-19. REMOVAL OF STARTING FUEL SOLENOID VALVE (T53-L-15/701 Engines). (See figure 5-4.) Proceed as follows:

WARNING

Ensure that all electrical power is disconnected.

a. Disconnect electrical connector from solenoid valve (7).

b. Disconnect hose assemblies (15 and 1).

c. Remove bolts (13) that secure solenoid valve (7) and bracket (12) to compressor housing.

d. Remove screws (8) and nuts (14) and remove solenoid valve (7) from bracket (12).

5-20. INSTALLATION OF STARTING FUEL SOLENOID VALVE (T53-L-15/701 Engines) (See figure 5-4.) Proceed as follows:

a. Secure solenoid valve (7) to bracket (12) using screws (8) and nuts (14).

b. Secure valve assembly and bracket to compressor housing using bolts (13). Tighten bolts as required and lockwire.

c. Connect hose assemblies (15 and 1).

d. Connect electrical cable connector to solenoid valve.

5-21. REMOVAL OF MAIN FUEL HOSES (T53-L-7/7A Engines). (See figure 5-5.) Proceed as follows:

a. Disconnect main fuel hose (6) and main fuel hose (7) from bypass fuel filter. Disconnect main fuel hose (7) from union (4) or from flowmeter, if installed, and main fuel hose (6) from main fuel manifold. Remove hoses. Disconnect main fuel hose (2) from union (4) or flowmeter and from main fuel control fitting. Remove hose.

b. Remove screw (8) and nut (9) that secure fuel hose (10) to engine. Disconnect hose from fuel filter and from fuel control. Remove hose.

c. Disconnect vapor return bent hose (1) fr main fuel filter and from fuel control. Remove

5-22. INSTALLATION OF MAIN FUEL HOSES L-7/7A Engines). (See figure 5-5.) Proceed as follows:

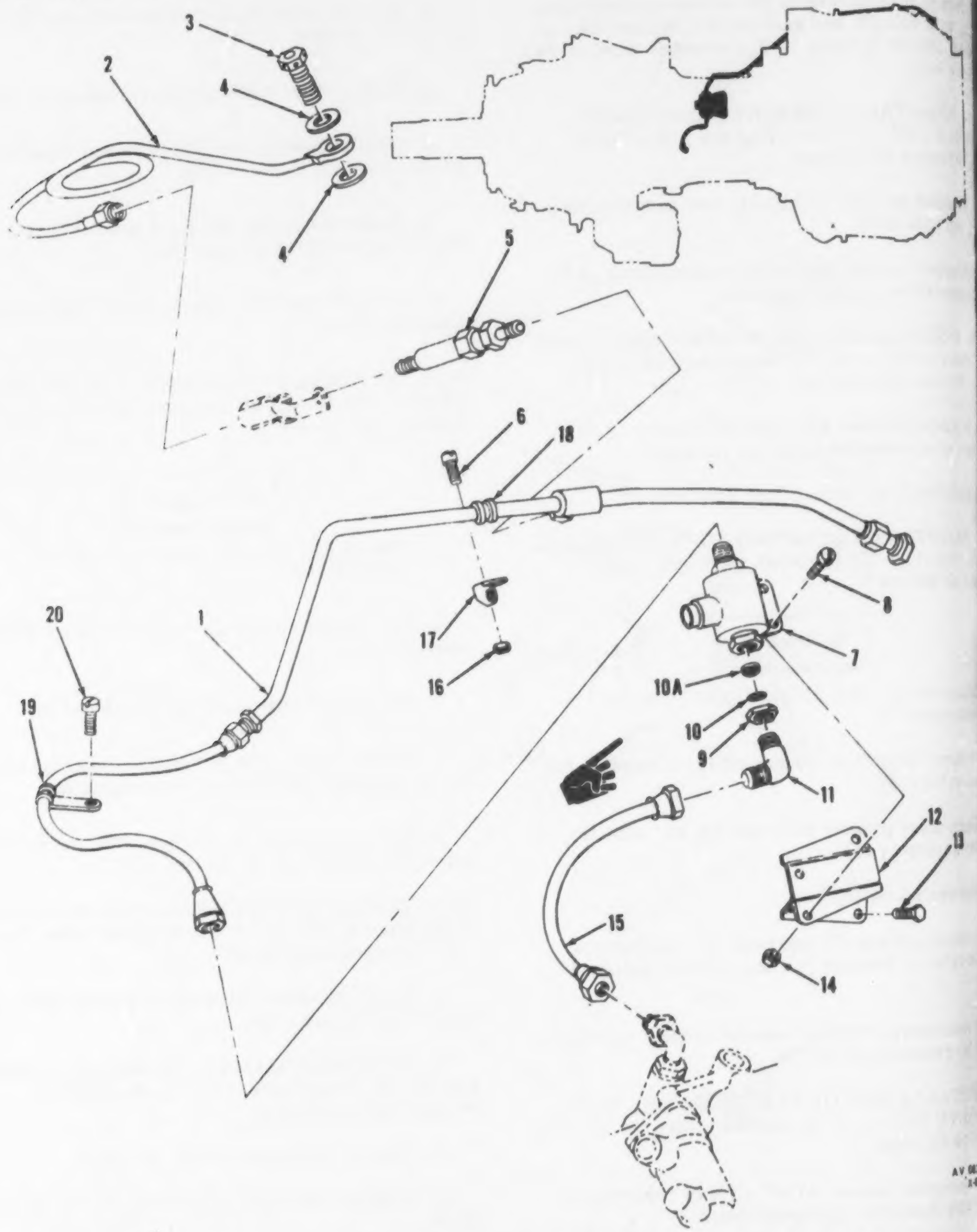


Figure 5-4. Starting Fuel Hose Assemblies, Check Filter Valve, Solenoid Valve Assembly, and Attaching Parts (T53-L-15/701)

Key to Figure 5-4.

Starting Fuel Hose Assembly
Tube Assembly
Bolt
Gasket
Check Filter Valve
Screw
7. Solenoid Valve
8. Screw
9. Nut
10. Gasket
10A. Screen
11. Elbow
12. Bracket
13. Bolt
14. Nut
15. Starting Fuel Hose Assembly
16. Nut
17. Bracket
18. Clamp
19. Clamp
20. Screw

. Connect main fuel hose (6) and main fuel hose o bypass fuel filter. Connect main fuel hose (7) nion (4) or flowmeter, if installed. Connect main hose (6) to fuel manifold. Connect main fuel hose o union (4), or flowmeter, and to main control fit-

. Connect main fuel hose (10) to fuel control fuel port and to main fuel filter outlet port. Secure with screw (8) and nut (9).

. Connect vapor return vent hose (1) to tee on fuel r and to vent port in engine overspeed governor.

. REMOVAL OF BYPASS FUEL FILTER (T53-L- Engines). (See figure 5-6.) Proceed as follows:

NOTE

After complying with following step a. ensure that union (6) and packing (5) remain installed in fuel filter housing (3).

Disconnect main fuel hose assembly (12) from fitting. Disconnect main fuel hose assembly (7) union (6).

Remove bolts (4), nuts (1), and locking plate (2) ecure filter to diffuser housing flange. Remove

. DISASSEMBLY OF BYPASS FUEL FILTER L-7/7A Engines). (See figure 5-6.) If it is sary to remove filter element (11), remove plug cking (9), spring (10), and filter element (11) fuel filter housing (3). Remove packing from

MINOR SERVICING OF BYPASS FUEL FILTER L-7/7A Engines). (See figure 5-6.) Proceed lows:

Before cleaning bypass fuel filter, visually infilter element for contamination.

If initial inspection reveals contamination, dee source by inspecting servo supply filter L-7/7A) (paragraph 5-69), or servo filter and r assembly (T53-L-15/701) (paragraph 5-72) in fuel filter (paragraph 5-55). If either or spections reveal no contamination, clean bylter and fuel line between filter and fuel conf main fuel filter is contaminated, check airuel system and remedy as required.

CAUTION

To prevent damage to screen, use low air pressure to dry filter element in following step c.

c. Clean filter element, plug, spring, and housing with drycleaning solvent (item 28, table 2-2). Air-dry.

d. Inspect all parts for cracks, distortion, and other damage. Replace with these defects.

e. Repair minor thread damage as outlined in paragraph 7-138.

f. Replace damaged parts and parts that have irreparable thread damage.

5-26. ASSEMBLY OF BYPASS FUEL FILTER (T53-L-7/7A Engines). (See figure 5-6.) Proceed as follows:

a. Insert filter element (11) and spring (10) into fuel filter housing (3).

b. Install packing (9) on plug (8). Lubricate threads of plug with lubricating oil (item 62, table 2-2) and install plug and packing in housing. Tighten plug to 100 to 125 pound-inches torque. Lockwire plug.

5-27. INSTALLATION OF BYPASS FUEL FILTER (T53-L-7/7A Engines). (See figure 5-6.) Proceed as follows:

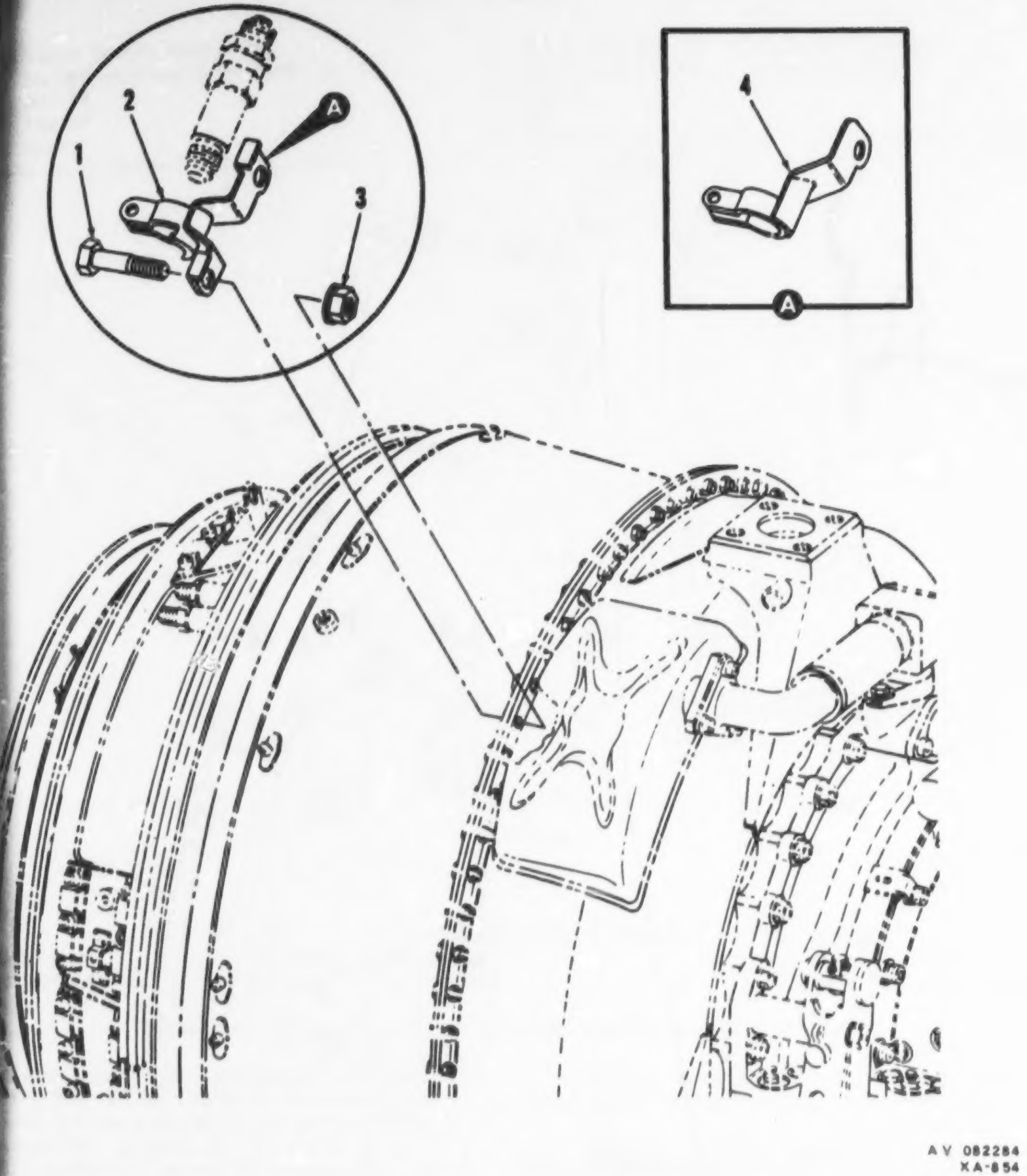
a. Position mounting flange of bypass fuel filter housing on forward side of diffuser housing flange. Align holes and secure bypass fuel filter to engine with bolts (4), locking plate (2), and nuts (1).

CAUTION

In following step b. when tightening coupling nut on main fuel hose assembly (7), hold union (6) from turning with a second wrench.

b. Connect main fuel hose assembly (12) to inlet fitting and main fuel hose assembly (7) to union (6). Tighten hose coupling nuts.

5-28. REMOVAL OF MAIN FUEL HOSES (T53-L-15/701 Engines). (See figure 5-7.) Proceed as follows:


2
1
A
3
4
A
AV 082284
KA-854

1. Bolt
2. Bracket and Clamp Assembly
3. Nut
4. Bracket and Clamp Assembly

Figure 5-4A. Bracket and Clamp Assembly and Attaching Parts (T53-L-15/701)

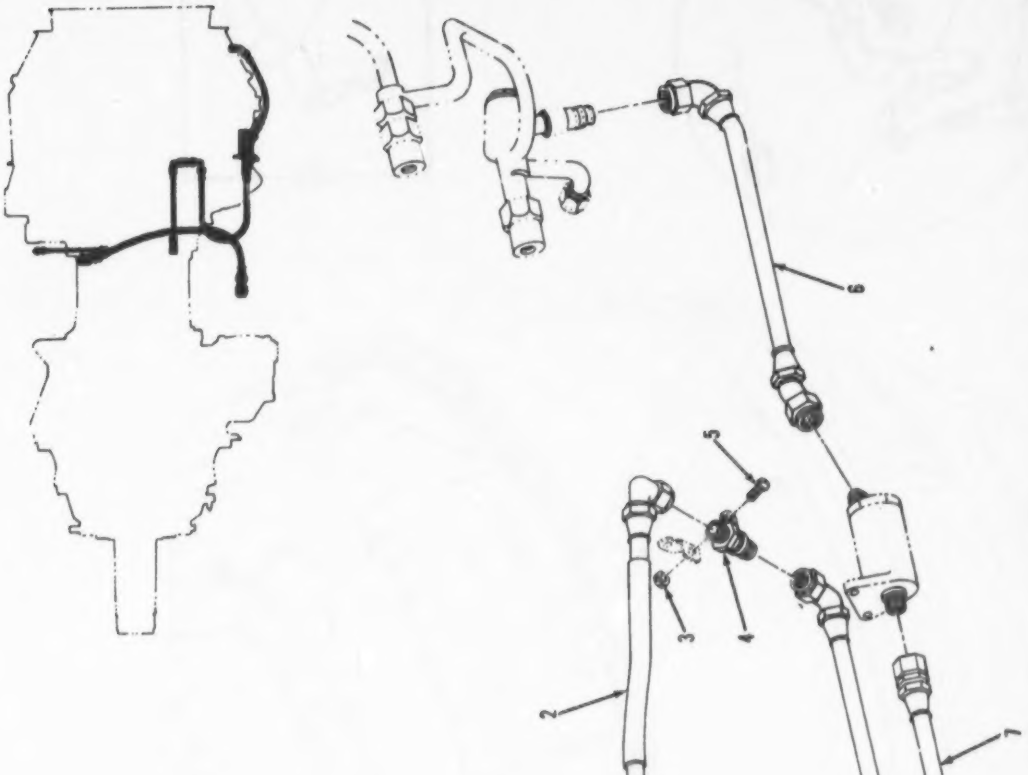
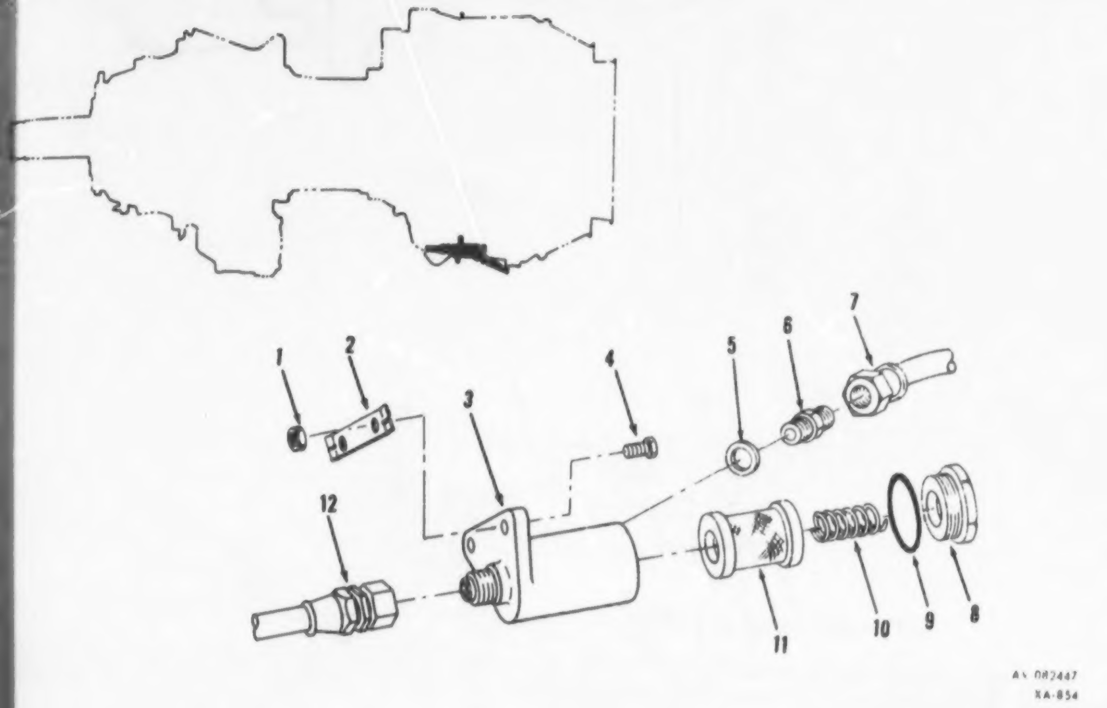

1
2
3
4
5
6
7
8
9
10

Figure 5-2. Main Fuel Hoses and Attaching Parts (T53-L-7/7A)

Key to Figure 5-5.

1. Vapor Return Vent Hose
2. Main Fuel Hose (from Fuel Control)
3. Nut
4. Union
5. Screw
6. Main Fuel Hose (to Main Fuel Manifold)
7. Main Fuel Hose (to Bypass Fuel Filter)
8. Screw
9. Nut
10. Main Fuel Hose (to Fuel Control Inlet Port)



t
cking Plate
el Filter Housing
4. Bolt
5. Packing
6. Union
7. Main Fuel Hose Assembly
8. Plug
9. Packing
10. Spring
11. Filter Element
12. Main Fuel Hose Assembly

Figure 5-6. Bypass Fuel Filter and Attaching Parts (T53-L-7/7A)

Disconnect main fuel hose assembly (8) from (4) and flow divider and dump valve assembly. e nuts (10) and screws (6) that secure clamps brackets (9). Remove screw (7) that secures (5) to engine and remove hose assembly. Dist hose assembly (3) from union (4) and from uel control fitting and remove hose assembly.

Remove screw (13) and nut (14) from clamp at secures fuel filter hose assembly (2) to t (11). Disconnect hose assembly from fuel l assembly, and from union on fuel filter bly. Remove hose assembly.

Disconnect hose assembly (1) from tee on main ter and from engine overspeed governor. Reose assembly.

INSTALLATION OF MAIN FUEL HOSES (T53-01 Engines). (See figure 5-7.) Proceed as :

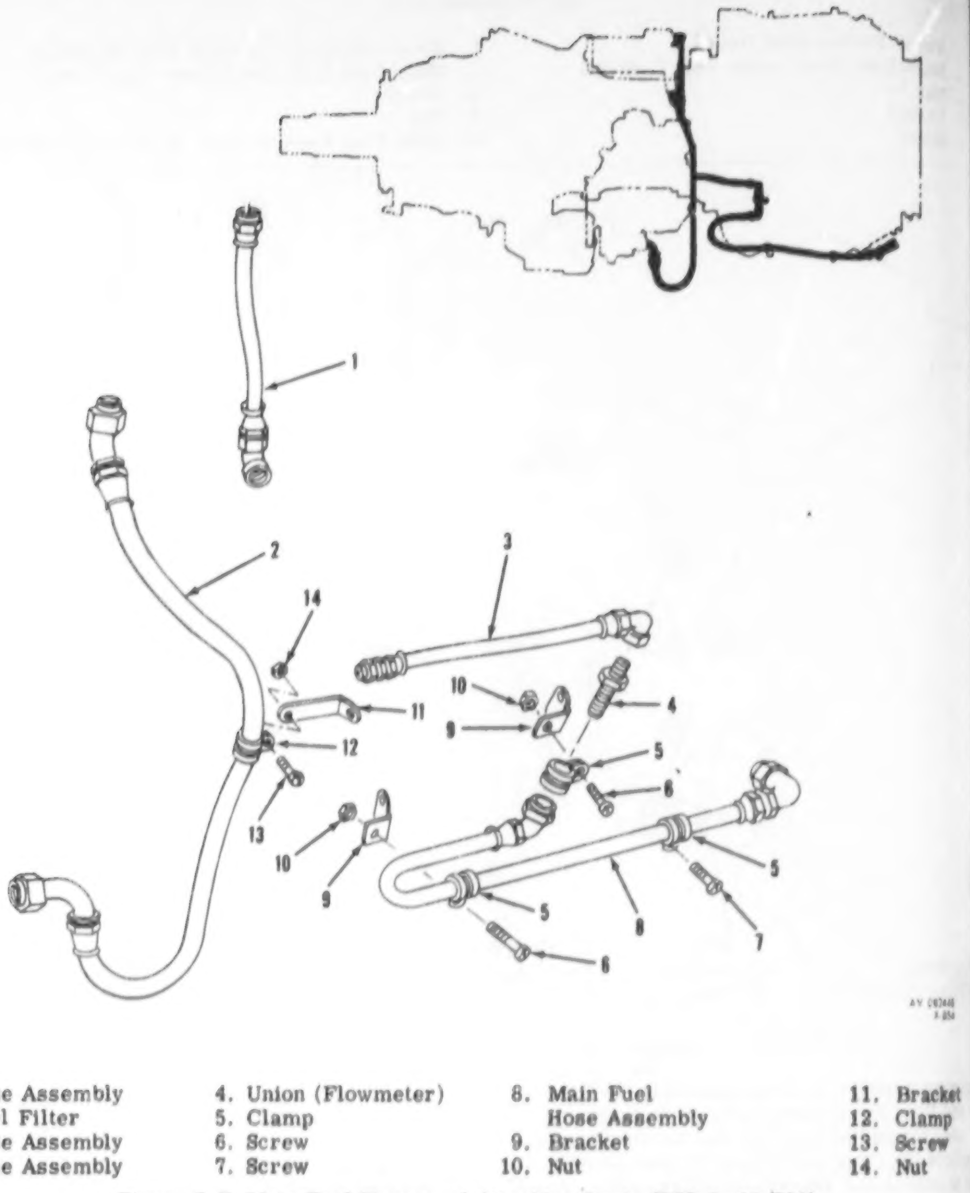
a. Connect hose assembly (1) to tee on main fuel filter and to engine overspeed governor.

b. Secure fuel filter hose assembly (2) and clamp (12) to bracket (11) with screw (13) and nut (14). Connect hose assembly to fuel control assembly and fuel filter assembly.

c. Connect main fuel hose assembly (8) to union (4) and to flow divider and dump valve assembly. Secure clamps (5) to brackets (9) with screws (6) and nuts (10). Secure clamp (5) to engine with screw (7). Connect hose assembly (3) to union (4) and main fuel control fitting.

5-30. REMOVAL OF TORQUE LIMITER TUBE ASSEMBLY (T53-L-15 Engine). (See figure 5-8.) Proceed as follows:

a. Disconnect tube assembly (3) from torque limiter and from accessory drive gearbox assembly.



1. Hose Assembly
2. Fuel Filter Hose Assembly
3. Hose Assembly
4. Union (Flowmeter)
5. Clamp
6. Screw
7. Screw
8. Main Fuel Hose Assembly
9. Bracket
10. Nut
11. Bracket
12. Clamp
13. Screw
14. Nut

Figure 5-7. Main Fuel Hoses and Attaching Parts (T53-L-15/701)

b. Remove screws (4), nuts (1) and clamps (2) that secure tube assembly to inlet housing and oil temperature bulb connector.

5-31. INSTALLATION OF TORQUE LIMITER TUBE ASSEMBLY (T53-L-15 Engines).(See figure 5-8.) Proceed as follows:

a. Connect tube assembly (3) to torque limiter and to accessory drive gearbox assembly.

b. Secure bleed line to inlet housing and oil temperature bulb connector with clamps (2) and screws (4) and nuts (1).

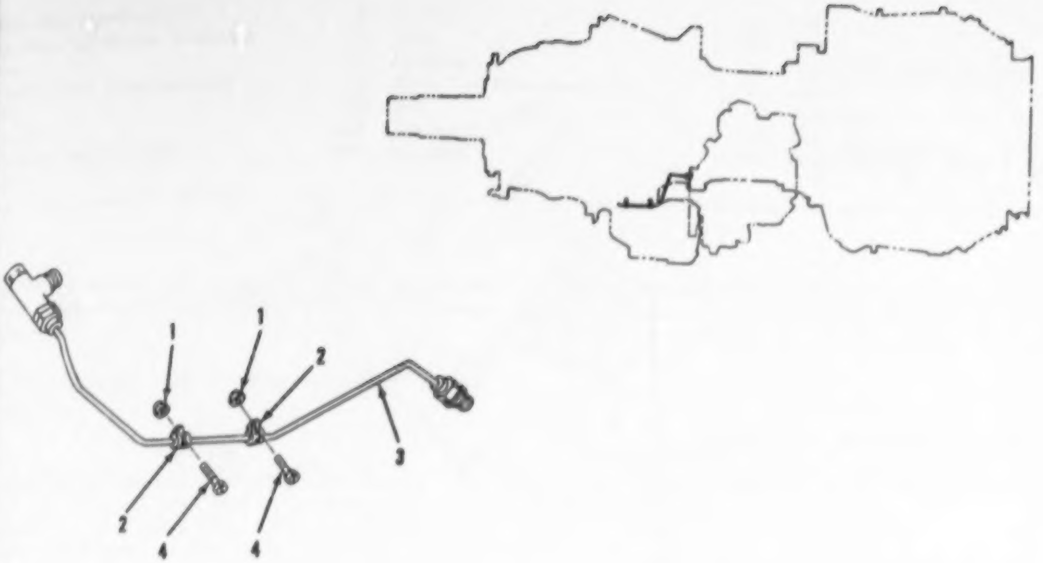
5-32. REMOVAL OF STARTING AND MAIN FUEL MANIFOLDS AND STARTING FUEL NOZZLES (T53-L-7/7A Engines). (See figure 5-9.) Proceed as follows:

a. Disconnect main fuel assembly (12) fro fuel manifold.

CAUTION

In following step b. when loosening connector nuts (fuel manifold to fuel vaporizer), use one wrench to prevent twisting of manifold leg while turning nut with second wrench. If wrench flat is not present, hold filter housing on main fuel manifold (LH) (1) (at 7-o'clock position) using slip-joint pliers with taped jaws.

b. Disconnect main fuel manifold (LH) (1) a fuel manifold (RH) (14) from fuel vaporizers.



1. Nut
2. Clamp
3. Tube Assembly (Torque Limiter)
4. Screw

Figure 5-8. Torque Limiter Tube Assembly and Attaching Parts (T53-L-15)

isconnect starting fuel hose assembly (4) from g fuel manifold (7). Remove nut (5) and washer (6).

CAUTION

n following step d. to prevent disassembly f fuel nozzle, hold nozzle adapter with a uitable wrench while loosening connector ut.

isconnect starting fuel manifold connectors ozzles.

CAUTION

fter complying with following step e., immediately cap manifolds and cover all exosed openings.

arefully lift off, as a unit, bracketed main and fuel manifolds.

necessary, separate starting fuel manifold ain fuel manifolds by removing screws (8) and) that secure clamps (9).

emove screws (3) and withdraw starting fuel ssemblies (2).

necessary, remove plug (10) and packing (11) ain fuel manifold (LH) (1).

5-33. INSTALLATION OF STARTING AND MAIN FUEL MANIFOLDS AND STARTING FUEL NOZZLES (T53-L-7/7A Engines).

(See figure 5-9.) Proceed as follows:

a. If removed, install packing (11) on plug (10) and install in main fuel manifold (LH) (1).

b. Secure starting fuel nozzle assemblies (2) to fire shield, at 4- and 8-o'clock positions, with screws (3). Lockwire screws.

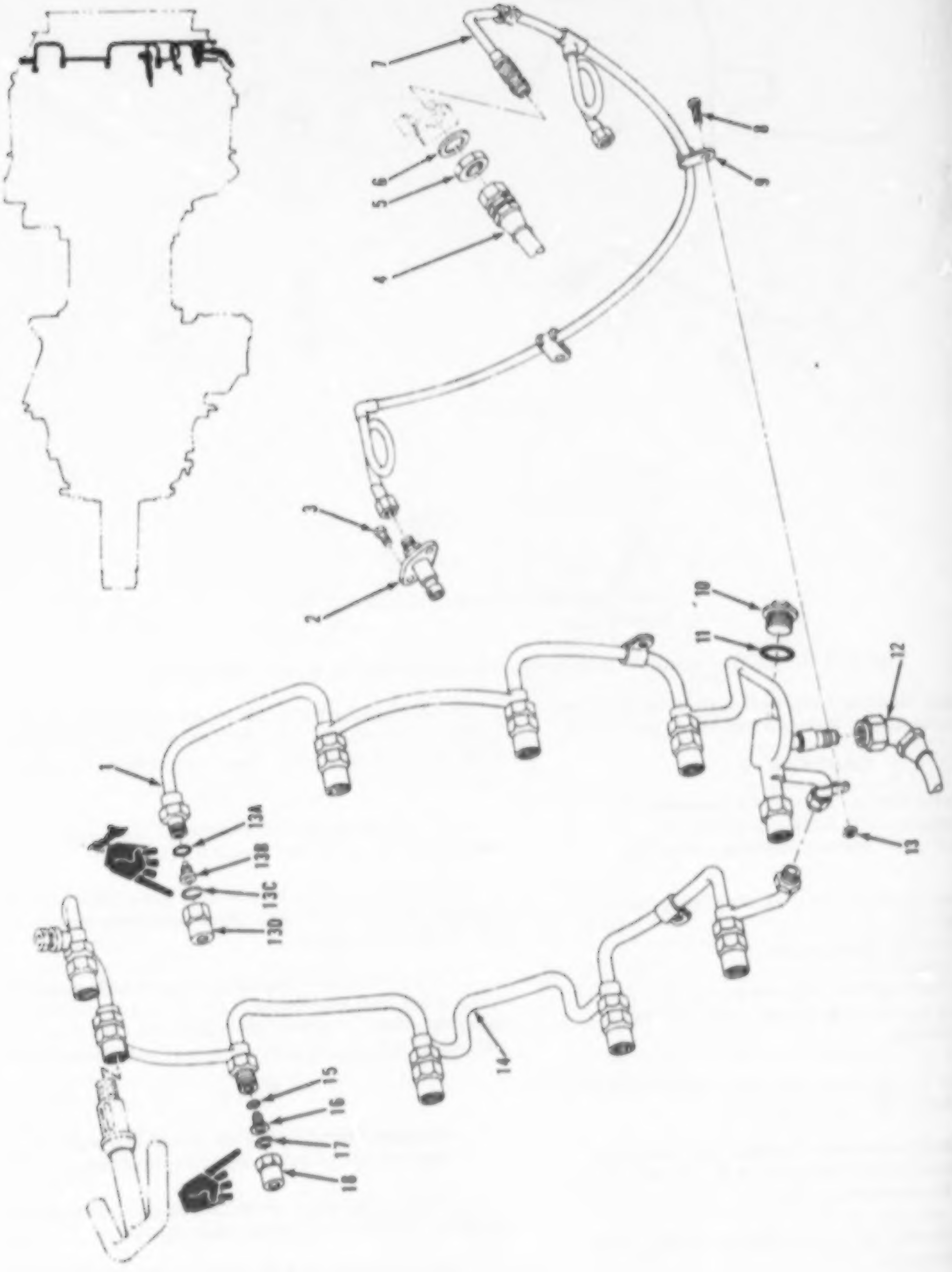
c. If starting fuel manifold (7) has been separated from main fuel manifolds (LH) (1) and main fuel manifold (RH) (14), bracket manifolds together by securing clamps (9) with screws (8) and nuts (13).

NOTE

Remove coverings from manifolds and inspect openings to ensure cleanliness.

d. Place bracketed starting and main fuel manifolds in position over rear support cone.

e. Secure starting fuel manifold (7) to support cone bracket with washer (6) and nut (5). Tighten nut. Connect starting fuel hose assembly (4) to starting fuel manifold.



Key to Figure 5-9.

ain Fuel Manifold (LH)
tarting Fuel Nozzle Assembly
crew
tarting Fuel Hose Assembly
ut
asher
arting Fuel Manifold
crew
9. Clamp
10. Plug
11. Packing
12. Main Fuel Hose Assembly
13. Nut
13A. Gasket
13B. Injector
13C. Pin
13D. Nut
14. Main Fuel Manifold (RH)
15. Gasket
16. Injector
17. Pin
18. Nut

---

f. Connect starting fuel manifold connectors to starting zzles. Tighten connectors. (Refer to table 11-3, reference r 93.)

g. Connect main fuel manifold connectors to fuel zers.

NOTE

n following step h., start with nut at filter housing (7-o'clock position), then tighten nut directly opposite (1-o'clock position), followed by nuts at the 8- and 2-o'clock positions, and continuing in this sequence until all nuts are tightened. Lockwire nuts.

NOTE

Before installation of main fuel manifold, check torque on injectors (figure 5-9, item 13B), torque injectors 115 to 125 pounds inches.

CAUTION

When tightening connector nuts (fuel manifold to fuel vaporizer) in following step h., use second wrench to prevent twisting of manifold leg while tightening nut with torque wrench. If wrench flat is not present, hold filter housing using slip-joint pliers with taped jaws.

h. Using calibrated torque wrench and fuel harness (LTCT4810 or LTCT2051, replaces LTCT219), tighten tor nuts as required. (Refer to table 11-3, reference num-)

. Connect main fuel hose assembly (12, figure 5-9) to uel manifold (LH) (1).

REMOVAL OF STARTING FUEL MAN- . (T53-L-15/701 Engines). (See figure 5-10). Proceed as :

. Remove starting fuel hose. (Refer to paragraph 5-15.)

. Clamps (10 and 19, figure 5-10) must be disconnected e ignition system. Remove screws and nuts that secure to clamps (10 and 19).

. Remove screws (1, 9, 12 and 18) that secure clamps (2, 17) to support cone.

. Remove nut (3) and washer (4) that secure tee (6) to cone bracket.

e. Disconnect connector nuts that hold manifold to starting fuel nozzles. Remove left- and right-hand fuel manifolds (7 and 16) and tee (6) as a unit. Remove washer (5). Immediately cap all openings.

NOTE

Further disassembly is not normally required unless a manifold or tee is to be replaced. If a manifold or tee is to be replaced follow directions given in following step f.

f. Loosen connector nuts and separate left-hand fuel manifold (7) and right-hand manifold (16) from tee (6).

5-35. INSTALLATION OF STARTING FUEL MANIFOLD. (T53-L-15/701 Engines). (See figure 5-10.) Proceed as follows:

NOTE

Do not tighten connector nuts to full torque at this time.

a. Position left- and right-hand fuel manifolds (7 and 16) on tee (6) and hand-tighten connector nuts.

b. Position washer (5) on tee (6).

c. Position manifolds over support cone and insert tee (6) into support cone bracket. Align connector nuts with starting fuel nozzles and hand-tighten connector nuts.

d. Tighten all connector nuts as required. (Refer to table 11-3, reference number 93.)

e. Install washer (4, figure 5-10) and nut (3) on tee (6) and tighten as required. (Refer to table 11-3, reference number 93.)

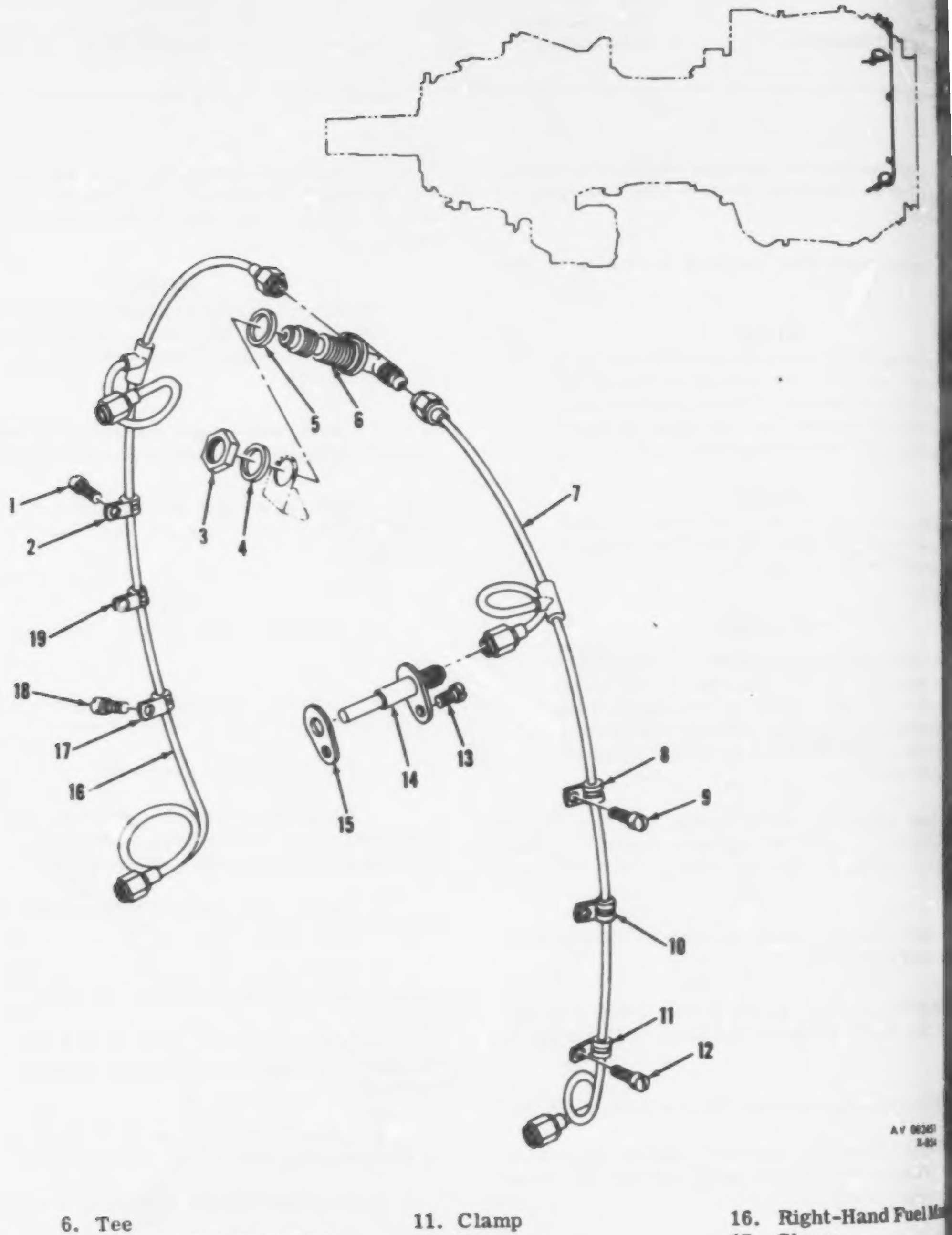
f. Secure clamps (2, 8, 11, 17, figure 5-10) with screws (1, 9, 12, 18) to support cone. Tighten screws as required and lockwire.

g. Connect clamps (10 and 19) to clamps on ignition coil and lead assembly. Secure with screws and nuts.

h. Install starting fuel hose. (Refer to paragraph 5-16.)

5-36. REMOVAL OF STARTING FUEL NOZZLES. (T53-L-15/701 Engines). (See figure 5-10.) Proceed as follows:

a. Disconnect starting fuel manifolds. (Refer to paragraph 5-34.)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1. Screw
2. Clamp
3. Nut
4. Washer
5. Washer
6. Tee
7. Left-Hand Fuel Manifold
8. Clamp
9. Screw
10. Clamp
11. Clamp
12. Screw
13. Screw
14. Starting Fuel Nozzle
15. Sealing Gasket
16. Right-Hand Fuel
17. Clamp
18. Screw
19. Clamp

Figure 5-10. Starting Fuel Manifolds and Starting Fuel Nozzles and Attaching Parts (T53-L-15/701)

Remove screws (13, figure 5-10) and withdraw ing fuel nozzles (14) from combustion chamber. ove sealing gaskets (15).

If heavy coking and clogging are evident, in- check filter valve. (Refer to paragraph 7-85.)

INSTALLATION OF STARTING FUEL NOZ- (T53-L-15/701 Engines). (See figure 5-10.) eed as follows:

NOTE

The starting fuel nozzles are installed through mounting pads on the main fuel manifolds at approximately the 2-, 4-, 8-, and 10-o'clock positions.

Replace sealing gaskets (15) on starting fuel es (14). Install starting fuel nozzles into com- n chamber and secure with screws (13). Tighten s as required and lockwire.

Maintain a clearance as given in table 11-4, nce number 83, between nozzle and combustor e.

Connect starting fuel manifolds. (Refer to raph 5-35.)

REMOVAL OF FLOW DIVIDER AND DUMP E HOSES (T53-L-15/701 Engines). (See figure Proceed as follows:

CAUTION

After complying with following step a. immediately cap flow divider and fuel manifold ports.

Disconnect secondary and primary hose assem- 1 and 2) from right-hand fuel manifold and from vider and dump valve assembly (6). Remove ssemblies.

CAUTION

After complying with following step b. immediately cap flow divider and fuel manifold ports.

Disconnect primary and secondary hose assem- 7 and 8) from left-hand fuel manifold and from vider and dump valve assembly. Remove hose blies.

CAUTION

After complying with following step c. im- ediately cap flow divider and drain valve orts.

Disconnect hose assembly (13) from flow divider p valve assembly and from combustion cham- in valve assembly (12). Remove hose assembly.

5-39. INSTALLATION OF FLOW DIVIDER AND DUMP VALVE HOSES (T53-L-15/701 Engines). (See figure 5-11.) Proceed as follows:

CAUTION

Do not remove caps from ports until the hose assembly for the port is to be connected.

a. Connect hose assembly (13) to combustion chamber drain valve assembly (12) and to flow divider and dump valve assembly (6). Tighten hose connectors.

b. Connect primary and secondary hose assemblies (7 and 8) to left-hand fuel manifold and to flow divider and dump valve assembly (6). Tighten hose connectors.

c. Connect secondary and primary hose assemblies (1 and 2) to right-hand fuel manifold and flow divider. Tighten hose connectors.

5-40. REMOVAL OF FLOW DIVIDER AND DUMP VALVE ASSEMBLY (T53-L-15/701 Engines). (See figure 5-11.) Proceed as follows:

NOTE

Removal of flow divider and dump valve assembly shall not be accomplished unless replacement is intended.

CAUTION

After complying with following step a. immediately cap hose assembly ports.

a. Disconnect fuel inlet line and hose assemblies (1, 2, 7, 8, and 13) from flow divider and dump valve assembly (6).

b. Remove support assembly from support cone. (Refer to paragraph 6-23, steps c. and d.)

c. Remove screws (3, 4, and 5, figure 5-11) that secure flow divider and dump valve assembly to support assembly.

d. Remove flow divider and dump valve assembly (6) and spacer (9) from support assembly.

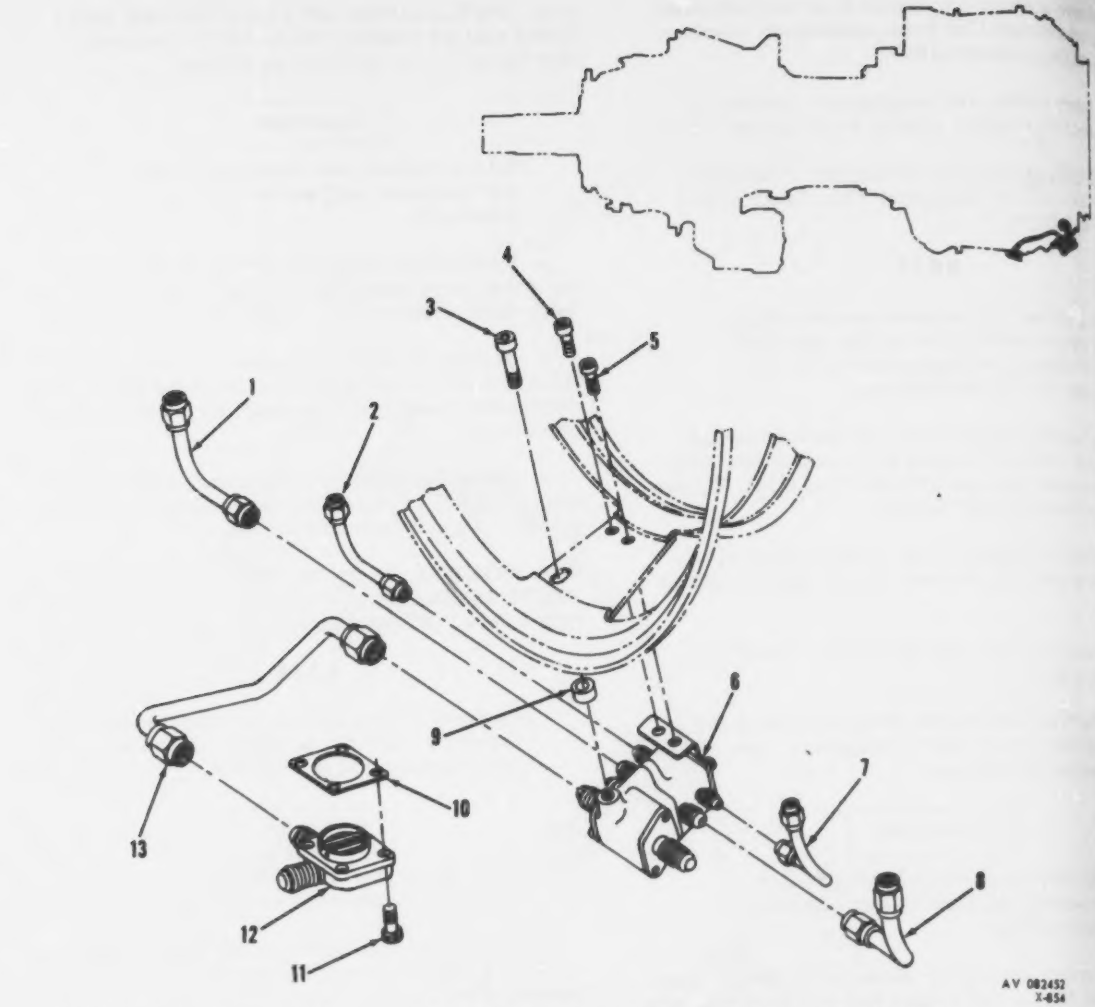
5-41. INSTALLATION OF FLOW DIVIDER AND DUMP VALVE ASSEMBLY (T53-L-15/701 Engines). (See figure 5-11.) Proceed as follows:

a. Position spacer (9) and flow divider and dump valve assembly (6) against support assembly.

b. Secure flow divider with screws (3, 4, and 5). Tighten screws as required and lockwire.

c. Reinstall support assembly on support cone. (Refer to paragraph 8-71.)

d. Remove protective caps from ports and secure hose assemblies (1, 2, 7, 8, and 13, figure 5-11) to flow divider and dump valve assembly (6). Reconnect fuel inlet line.



1. Hose Assembly (Secondary)
2. Hose Assembly (Primary)
3. Screw
4. Screw
5. Screw
6. Flow Divider and Dump Valve Assembly
7. Hose Assembly (Primary)
8. Hose Assembly (Secondary)
9. Spacer
10. Gasket
11. Bolt
12. Combustion Chamber Dr Valve Assembly
13. Hose Assembly

Figure 5-11. Flow Divider and Dump Valve Assembly and Combustion Chamber Drain Valve Assembly and Attaching Parts (T53-L-15/701)

5-42. REMOVAL OF COMBUSTION CHAMBER DRAIN VALVE ASSEMBLY (T53-L-7/7A Engines). (See figure 5-12.) Proceed as follows:

a. Remove bolts (3) that secure combustion chamber drain valve (2) to combustion chamber.

b. Remove drain valve and gasket (1).

5-43. INSTALLATION OF COMBUSTION CHAMBER DRAIN VALVE ASSEMBLY (T53-L-7/7A Engines). (See figure 5-12.) Proceed as follows:

a. Install gasket (1) on combustion chamber drain valve (2).

NOTE

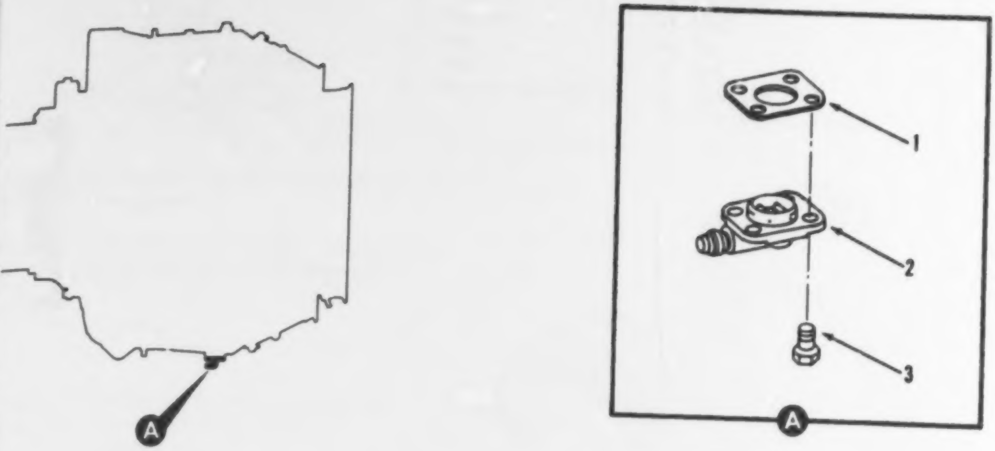
In following step b., connector fitting faces forward.

b. Secure drain valve and gasket to bottom combustion chamber with bolts (3).

c. Lockwire bolts (3).

5-44. REMOVAL OF COMBUSTION CHAMBE DRAIN VALVE ASSEMBLY (T53-L-15/701 Eng (See figure 5-11.) Proceed as follows:

a. Disconnect overboard drain hose and ho sembly (13) from combustion chamber drain va assembly (12) and plug hose.



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1. Gasket 2. Combustion Chamber Drain Valve 3. Bolt

Figure 5-12. Combustion Chamber Drain Valve Assembly and Attaching Parts (T53-L-7/7A)

emove bolts (11) that secure drain valve to tion chamber housing. Remove combustion r drain valve assembly (12) and gasket (10).

NSTALLATION OF COMBUSTION CHAMBER VALVE ASSEMBLY (T53-L-15/701 Engines). ure 5-11.) Proceed as follows:

osition gasket (10) and combustion chamber lve assembly (12) on combustion chamber

cure combustion chamber drain valve assem- bolts (11). Tighten bolts and lockwire.

nnect overboard drain hose assembly (13) to lve assembly. Tighten hose connectors as d. (Refer to table 11-3, reference number

EMOVAL OF MAIN FUEL MANIFOLD (T53- 1 Engines). (See figure 5-13.) Proceed as

CAUTION

e fuel manifold is a high value item and st be carefully repacked for shipment to pot maintenance. Enclose manifold in rrier material (item 9, table 2-2) or in transparent plastic bag (item 111, table 2) and secure in reusable container. The tainer should then be closed in a water- oof cardboard box and identified for ship- nt.

NOTE

Removal of fuel manifold assembly shall not be accomplished unless replacement is intended. Replace one-half at a time with other half secured.

a. Disconnect ignition leads from igniter plugs and remove clamps that secure leads to support cone. (Refer to paragraph 5-131.)

b. Remove starting fuel manifolds and starting fuel nozzles. (Refer to paragraphs 5-34 and 5-36.)

NOTE

Support cone may also be removed as a unit in lieu of following steps c. and d. (Refer to paragraph 6-20.)

c. Remove bolts (10, 11, 15, and 17, figure 5-13), and retainers (8, 9, 14, and 18) that secure support assemblies (12 and 19) to support cone.

d. Withdraw pins (13 and 16) and support assemblies (12 and 19) from support cone.

e. Disconnect hose assemblies from fuel manifold assemblies (5) and cap all open connectors.

f. Remove bolts (4) that secure fuel manifold assembly to rear face of combustion chamber housing. Carefully withdraw manifold assembly from combustion chamber to avoid damage to parts.

g. Remove seals (1) from nozzles.

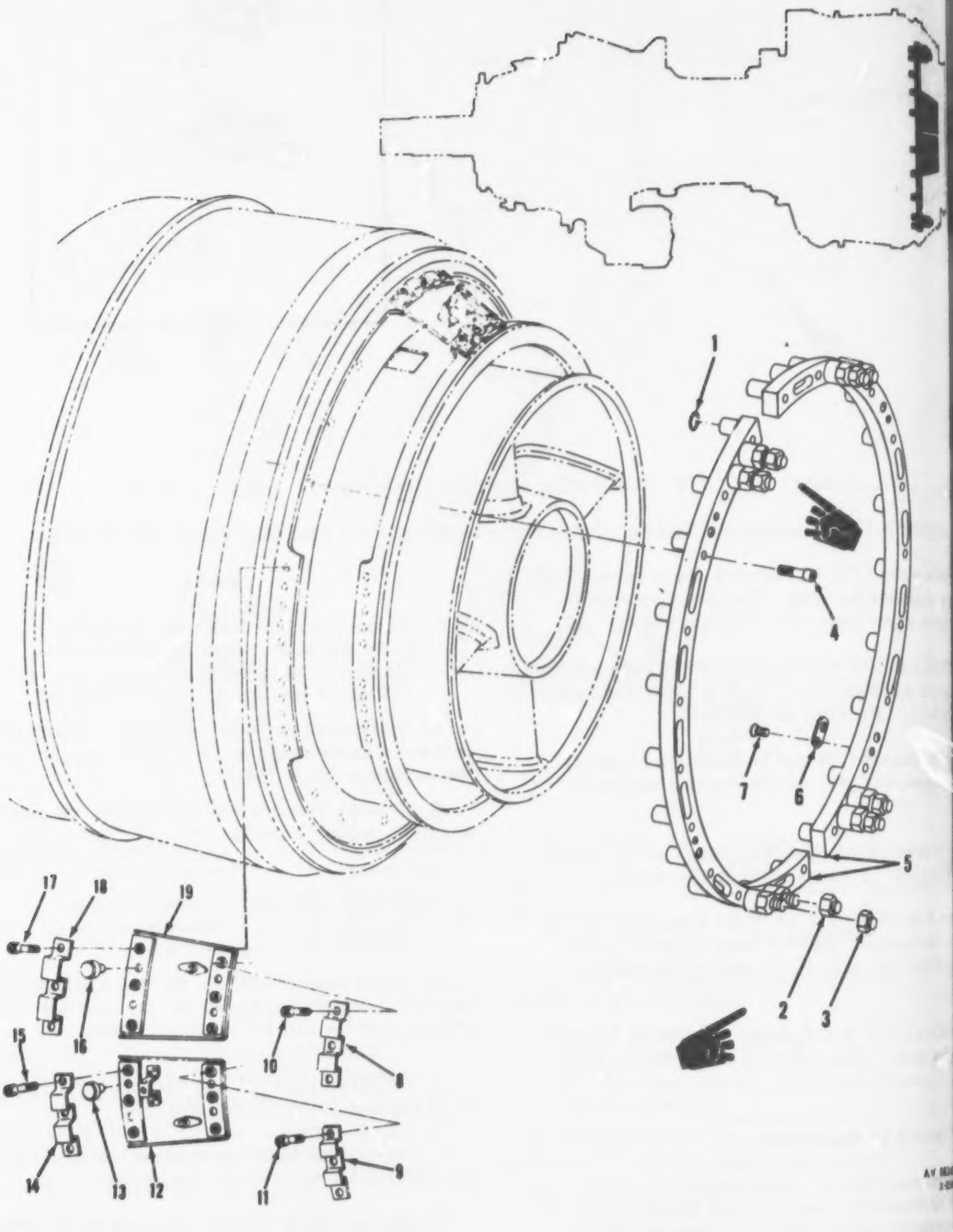
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Figure 5-13. Main Fuel Manifold Assembly and Attaching Parts (T53-L-15/701)

Key to Figure 5-13.

1. Seal
2. Cap
3. Cap
4. Bolt
5. Fuel Manifold Assemblies
6. Sealing Gasket
7. Screw
8. Retainer
9. Retainer
10. Bolt
11. Bolt
12. Support Assembly
13. Pin
14. Retainer
15. Bolt
16. Pin
17. Bolt
18. Retainer
19. Support Assembly

---

emove screws (7) which secure sealing gaskets (6) to nifold. Remove gaskets.

NSTALLATION OF MAIN FUEL MANIFOLD 15/701 Engines). (See figure 5-13.) Proceed as

NOTE

anifold assemblies can be used interchangeably on either right or left side of engine.

sition sealing gaskets (6) on fuel manifold at the 2-, nd 10- o'clock positions and secure with screw (7). screw as required.

sition seals (1) on each nozzle.

tall caps (2 and 3) over unused ports on fuel mani- emblies (5).

ng alignment fixture (LTCT4174), align nozzle combustion chamber liner and ports in combustion housing. Remove fixture.

lign primary ports of manifold (see figure 5-13A) mary ports of flow divider and dump valve on rear mbustion chamber housing. Secure manifold as- housing with bolts (4, figure 5-13). Tighten bolts ed and lockwire.

nect hose assemblies from flow divider to fuel s. Tighten hose connectors.

NOTE

the support cone assembly was removed as a it, reinstall as outlined in paragraph 8-74 and ceed to following step g.

tion support assemblies (12 and 19) on support cone ll pins (13 and 16). Secure support assemblies to cone with retainers (8, 9, 14, and 18) and bolts (10, d 17). Tighten bolts as required and lockwire.

ll starting fuel manifolds and starting fuel noz- fer to paragraphs 5-35 and 5-37.)

nect ignition leads to igniter plugs (Refer to para- 33.)

MOVAL OF FUEL FILTER AND FUEL R BRACKET ASSEMBLY. (See figure 5-14.) Pro- llows:

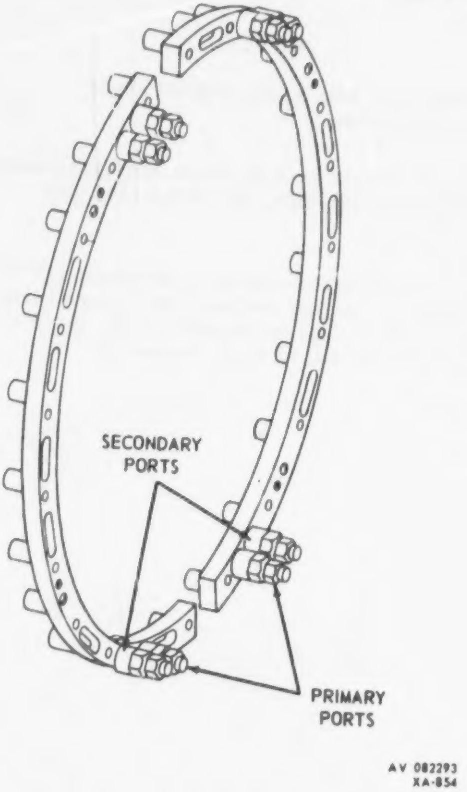


Figure 5-13A. Main Fuel Manifold - Primary and Secondary Ports (T53-L-15/701)

a. Disconnect oil lines at oil outlet and oil inlet ports (1 and 2) of fuel heater (5).

b. Disconnect fuel lines at fuel inlet port (23) in fuel heater and at fuel outlet port (13) and tee (10) of fuel filter assembly (14).

c. Disconnect wiring harness from pressure switch (13, figure 5-15, or 11, figure 5-16) and remove screws (24, figure 5-14) and nuts (22) that secure wiring harness main receptacle (21) to bracket (9).

d. Remove bolts (16) and clips (15).

e. Support the bracket assembly. Remove bolts (17), washers (18), shims (19), and nuts (20). Retain shims with bracket assembly.

f. Remove bracket assembly.

5-49. INSTALLATION OF FUEL FILTER AND FUEL HEATER BRACKET ASSEMBLY. (See figure 5-14.)

Proceed as follows:

a. Support bracket (9) and secure it to compressor housing rear flange with bolts (16) and clips (15). Lockwire bolts.

NOTE

In following step b. use original shims for installation.

b. Secure bracket to compressor housing forward flange with bolts (17), nuts (20), shims (19), and washers (18).

c. Secure wiring harness main receptacle (21) to bracket with screws (24) and nuts (22). Attach wiring harness connector to pressure switch (13, figure 5-15, or 11, figure 5-16) and lockwire connector.

d. Connect fuel lines at fuel inlet port (23, 5-14) in fuel heater and at fuel outlet port (13) tee (10) in fuel filter.

e. Connect oil lines at oil inlet and oil outle (2 and 1) in fuel heater.

5-50. REMOVAL OF FUEL HEATER ASSEMB

(See figure 5-14.) The fuel heater assembly m removed from the engine without removing the fuel filter and heater bracket assembly. The fo ing procedures are prepared for the separate moval of the fuel heater assembly.

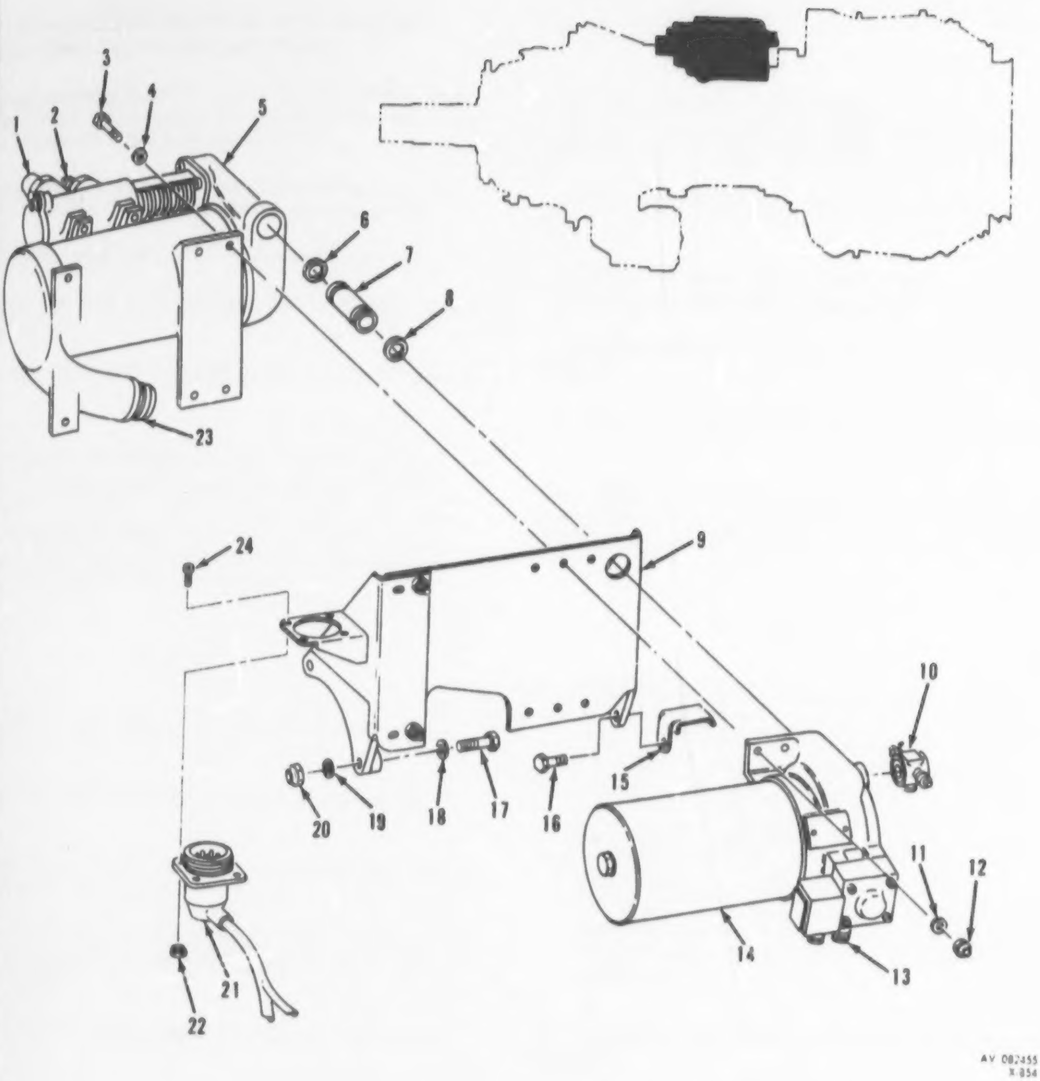
a. Disconnect fuel line at fuel inlet port (21)

b. Disconnect oil lines at oil inlet port (2) outlet port (1).

c. Remove bolts (3), nuts (12), and washers and 11.)

NOTE

In following step d. connecting tube may be capped and left installed in fuel filter.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1. Oil Outlet Port
2. Oil Inlet Port
3. Bolt
4. Washer
5. Fuel Heater
6. Packing
7. Connecting Tube
8. Packing
9. Bracket
10. Tee
11. Washer
12. Nut
13. Fuel Outlet Port
14. Fuel Filter Assembly
15. Clip
16. Bolt
17. Bolt
18. Washer
19. Shim
20. Nut
21. Wiring Harness Main Receptacle
22. Nut
23. Fuel Inlet Port
24. Screw

Figure 5-14. Fuel Filter, Heater, and Bracket Assembly and Attaching Parts

el heater (5) away from fuel filter assembly until ecting tube (7).

ve packings (6 and 8).

INSTALLATION OF FUEL HEATER ASSEM-

figure 5-14.) Proceed as follows:

packings (6 and 8) on either end of connecting nsure that packings are seated in grooves. Insert tube into fuel filter assembly (14).

on fuel heater (5) to mate connecting tube with t in the fuel heater. Push heater onto tube.

bolts (3), nuts (12), and washers (4 and 11).

ct oil lines to oil inlet port (2) and oil outlet port eater.

t fuel line to fuel inlet port (23) in fuel heater.

OVAL OF MAIN FUEL FILTER ASSEM-

123998 and P/N 045468. (See figure 5-14.) The ter assembly may be removed from the engine oving the entire fuel filter and heater bracket he following procedures are for the separate he main fuel filter assembly.

NOTE

e suitable container to receive drained

ect fuel lines at fuel outlet port (13) and tee

ect wiring harness from pressure switch (13, 11, figure 5-16).

plug (11, figure 5-15, or 13, figure 5-16) and gure 5-15, or 14, figure 5-16) and allow fuel to tainer.

bolts (3, figure 5-14), nuts (12) and washers (4

NOTE

cting tube may be capped and left in- in fuel heater.

filter assembly (14) away from fuel heater un- necting tube (7).

packings (6) and (8) from tube.

SEMBLY OF MAIN FUEL FILTER AS-

N 123998 (ORGANIZATIONAL MAIN- (See figure 5-15.) Proceed as follows:

a. Remove bolt (1) and seal (2).

b. Remove body assembly (3), element assembly (6), packings (5 and 7), and plug (4).

c. Remove screws (12) that secure pressure switch (13) and packings (9).

5-54. DISASSEMBLY OF MAIN FUEL FILTER ASSEMBLY, P/N 045468 (ORGANIZATIONAL MAINTENANCE).

(See figure 5-16.) Proceed as follows:

a. Twist bowl (1) counterclockwise until free from head (9).

b. Remove bowl, element assembly (5), packing (4), plug (3), packing (6), spring (7), and packing (8).

c. Remove screws (12) that secure pressure switch (11) to head (9).

d. Remove pressure switch (11) and packing (10).

5-55. MINOR SERVICING OF MAIN FUEL FILTER ASSEMBLY, P/N 123998 AND P/N 045468 (ORGANIZATIONAL MAINTENANCE).

NOTE

The main filter element in filter, P/N 123998 or P/N 045468, should be replaced if it is removed. Kits, P/N 129293 and P/N 049416, contain the replacement parts for both types of filter assemblies. Common parts for both filters are elements, P/N 123993 and P/N 047546, and packings, P/N 120974 and P/N 123995 and P/N 049046 and P/N 573914. Seals, P/N 123915 and P/N 049663 are used for filter, P/N 123998 only. Packing P/N 115171 and plug P/N 049042 are used for filter P/N 045468 only. If replacement elements are not available, proceed to following steps a, and b.

a. Inspect filter element for contamination or blockage.

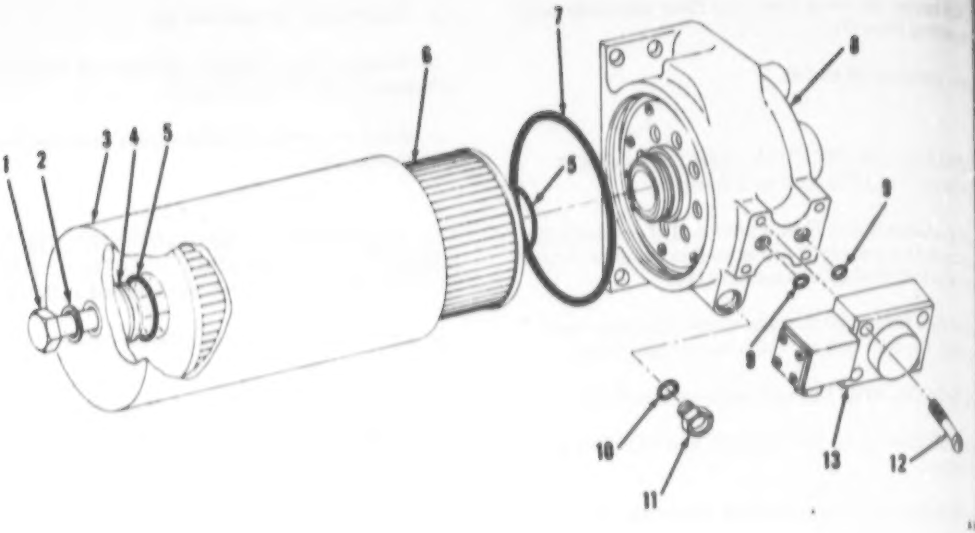
CAUTION

The main fuel filter element incorporates paper and a slurry as a filter media. When wet, this filter is easily damaged. Air pressure should be applied with caution to prevent tearing or shredding.

b. If contamination or blockage is noted agitate filter element in clean fuel (item 47, table 2-2). Airdry, using low air pressure, and reinstall element.

c. Repeat preceding step b. until element is clean.

d. Inspect all parts for cracks, dents, and other damage.



1. Bolt
2. Seal
3. Body Assembly
4. Plug
5. Packing
6. Element Assembly
7. Packing
8. Base Assembly
9. Packing
10. Packing
11. Plug
12. Screw
13. Pressure Switch

Figure 5-15. Main Fuel Filter Assembly P/N 123998 (Organizational Maintenance) - Exploded View

f. Inspect all parts for damage that would prevent proper functioning of main fuel filter assembly.

g. Replace all damaged parts.

5-56. ASSEMBLY OF MAIN FUEL FILTER ASSEMBLY, P/N 123998 (ORGANIZATIONAL MAINTENANCE). (See figure 5-15.) Proceed as follows:

a. Install packings (9) into base assembly (8). Position pressure switch (13) on base assembly and secure with screws (12). Lockwire screws.

b. Install plug (11) and packing (10).

c. Position packings (5) on plug (4) and base assembly (8), and install element assembly (6).

d. Install packing (7) into base assembly (8).

CAUTION

In following step e., extreme care must be taken to ensure that packings are not pinched or cut during installation.

e. Insert assembly into body assembly
stall seal (2) and bolt (1).

f. Tighten bolt (1) as required. (Refer
11-3, reference number 69.) Lockwire bol

5-57. ASSEMBLY OF MAIN FUEL FILTE
BLY, P/N 045468 (ORGANIZATIONAL MAI
NANCE). (See figure 5-16.) Proceed as f

a. Install packings (10) into head (9).
pressure switch (11) on head and secure
(12). Lockwire screws.

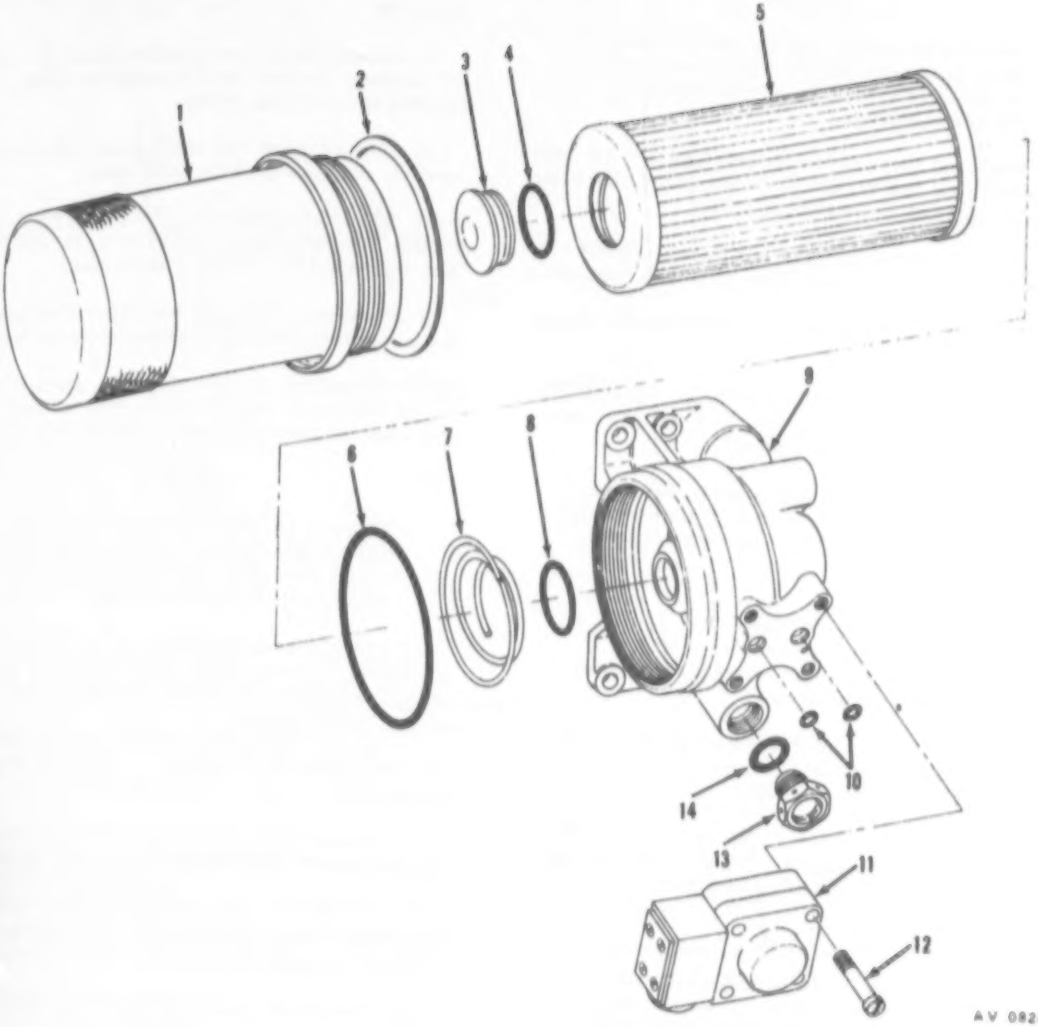
b. Position packings (4) on plug (3).

c. Insert element assembly (5) with pl
bowl (1).

d. Insert packings (6) and (8) and spri
head (9).

e. Screw bowl (1) into head (9).

5-58. INSTALLATION OF MAIN FUEL F
ASSEMBLY, P/N 123998 and P/N 045468
figure 5-14.) Proceed as follows:



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1. Bowl
2. Gasket
3. Plug
4. Packing
5. Element Assembly
6. Packing
7. Spring
8. Packing
9. Head
10. Packing
11. Pressure Switch
12. Screw
13. Plug
14. Packing

Figure 5-16. Main Fuel Filter Assembly, P/N 045468 (Organizational Maintenance) - Exploded View

a. Install packings (6 and 8) on either end of connecting tube (7). Ensure that packings are seated in grooves. Insert one end of tube into fuel heater (5). Ensure that drain plug (11, figure 5-15, or 13, figure 5-16) and packing (10, figure 5-15, or 14, figure 5-16) are installed in filter assembly.

CAUTION

In following step b., ensure that locating pin in base assembly of filter is seated in hole in bracket. Failure to seat pin can cause leakage.

b. Push fuel filter assembly (14, figure 5-14) onto connecting tube and secure filter assembly with bolts (3), nuts (12), and washers (4 and 11).

c. Connect wiring harness to pressure switch (13, figure 5-15, or 11, figure 5-16). Lockwire connector.

d. Connect fuel lines at fuel outlet port (13, figure 5-14) and at tee (10).

5-59. REMOVAL OF FUEL CONTROL AIR PRESSURE-SENSING HOSE (T53-L-7/7A Engines). (See figure 5-17.) Proceed as follows:

a. Remove screws (2) and nuts (3) that secure clamps (4) to brackets on overspeed governor and tachometer drive assembly compressor housing flange.

CAUTION

After complying with following step b. cap all openings immediately.

b. Disconnect fuel control air pressure-sensing hose assembly (1) from inlet housing and from fuel control. Remove hose assembly.

5-60. INSTALLATION OF FUEL CONTROL AIR PRESSURE-SENSING HOSE (T53-L-7/7A Engines). (See figure 5-17.) Proceed as follows:

NOTE

Prior to installation of fuel control air pressure-sensing hose (1), ensure that chafing sleeve is positioned where hose may come in contact with overspeed governor and tachometer drive gearbox.

a. Connect fuel control air pressure-sensing hose assembly (1) to inlet housing and to fuel control.

b. Secure hose with clamps (4), screws (2), and nuts (3) at brackets on overspeed governor and tachometer drive housing compressor housing flange.

5-61. REMOVAL OF FUEL CONTROL AIR PRESSURE-SENSING HOSE (T53-L-15/701 Engines). (See figure 5-18.) Proceed as follows:

a. Remove screw (5) and nuts (12) from clamp (4).

b. Remove screw (6) and nut (11) from cla

CAUTION

After complying with following step c., immediately cap all openings.

c. Remove hose assembly (8) from union (10) elbow (3).

d. Loosen nut (2) and remove elbow (3) with and packing (1) from inlet housing assembly. R packing and nut from elbow.

e. Remove union (10) with packing (9) from control. Remove packing from union.

5-62. INSTALLATION OF FUEL CONTROL AI PRESSURE-SENSING HOSE (T53-L-15/701 Eng (See figure 5-18.) Proceed as follows:

a. Position packing (9) onto union (10) and ins union into fuel control. Tighten union as requir

b. Thread nut (2) onto elbow (3) and position ing (1) on elbow. Install elbow with nut and into inlet housing assembly. Tighten nut

NOTE

Prior to installation of hose assem ensure that chafing sleeve is position where hose may come in contact with overspeed governor gearbox.

c. Connect hose assembly (8) to union (10) elbow (3). Tighten hose connectors as required (Refer to table 11-3, reference number 86.)

d. Secure clamp (4) to bracket on overspeed nor and tachometer drive assembly with screw and nut (12).

e. Secure clamp (7) to bracket on forward of compressor housing with screw (6) and nut

5-63. REMOVAL OF FUEL CONTROL TORQU LIMITER (T53-L-15 Engine). (See figure 5-1 Proceed as follows:

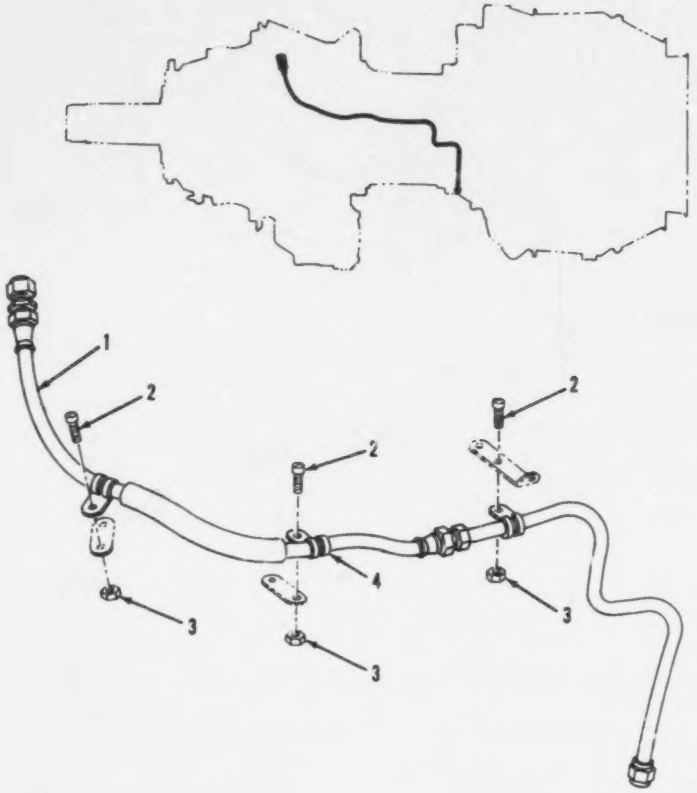
a. Disconnect oil and fuel/air lines from limiter.

b. Remove screws (2) that secure torque (1) to fuel control.

c. Carefully remove the torque limiter from the fuel control housing.

NOTE

It is possible that upon removal of the torque limiter the sleeve will remain within the fuel control housing port. If this should occur perform following steps d. and e.



1. Fuel Control Air Pressure-Sensing Hose Assembly
2. Screw
3. Nut
4. Clamp

Figure 5-17. Fuel Control Air Pressure-Sensing Hose and Attaching Parts (T53-L-7/7A)

d. Insert a mandrel or equivalent of the proper ameter into the sleeve.

e. Apply a slight off-center pressure and withdraw sleeve from the fuel control housing.

4. INSTALLATION OF FUEL CONTROL TORQUE MITER(T53-L-15 Engine). (See figure 5-19.) Pro-
d as follows:

NOTE

If a new replacement torque limiter kit (P/N 91737, FSCM 11599) is to be installed, under no circumstances may the sleeve of the new unit be separated from the remainder of the assembly. If separation should occur reject the unit and ship to depot maintenance for repair.

a. Install new packings and lubricate with petrola-
(item 87, table 2-2).

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b. Carefully insert the torque limiter assembly (1) into the fuel control housing.

c. Secure torque limiter (1) to fuel control using screws (2).

d. Tighten screws to 50 to 70 pound-inches torque. Lockwire.

e. Connect oil and fuel/air lines to torque limiter.

5-85. REMOVAL OF FUEL CONTROL SOLENOID VALVE (T53-L-7/7A Engines). (See figure 5-20.) Proceed as follows:

a. Remove screws (26 and 27) that secure solenoid support bracket (13) to fuel regulator.

b. Loosen nut (15) and screw (14) and slide support bracket from solenoid (24).

c. Remove screws (16) that secure solenoid to fuel regulator.

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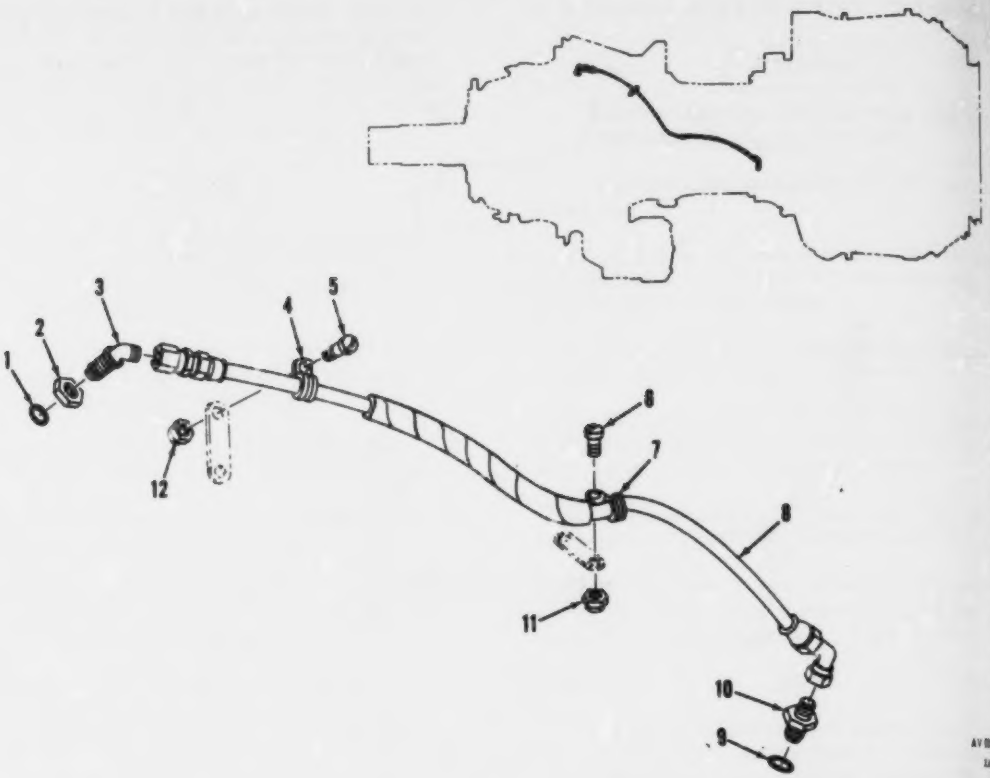


1. Packing	4. Clamp	7. Clamp	10. Union
2. Nut	5. Screw	8. Hose Assembly	11. Nut
3. Elbow	6. Screw	9. Packing	12. Nut

Figure 5-18. Fuel Control Air Pressure-Sensing Hose and Attaching Parts (T53-L-15/701)

CAUTION

If insert (23) is removed without balls, balls may be lost.

NOTE

Withdraw solenoid (24) only enough to insert finger to secure insert (23). Holding finger on insert, continue to remove solenoid and insert. If solenoid and insert are not removed together, balls will be lost. The insert shall remain in the solenoid until solenoid is installed.

d. Remove solenoid and shim (17). Record thickness of shim, then lockwire to solenoid to facilitate installation.

e. If either valve and sleeve assembly (22) or insert (23) is damaged, both parts must be replaced. Remove valve and sleeve assembly as follows:

(1) Using sleeve puller, (STD63557, FSCM 11599), remove valve and sleeve assembly from fuel control.

(2) Remove packing (18, 19, 20, and 21). card packing.

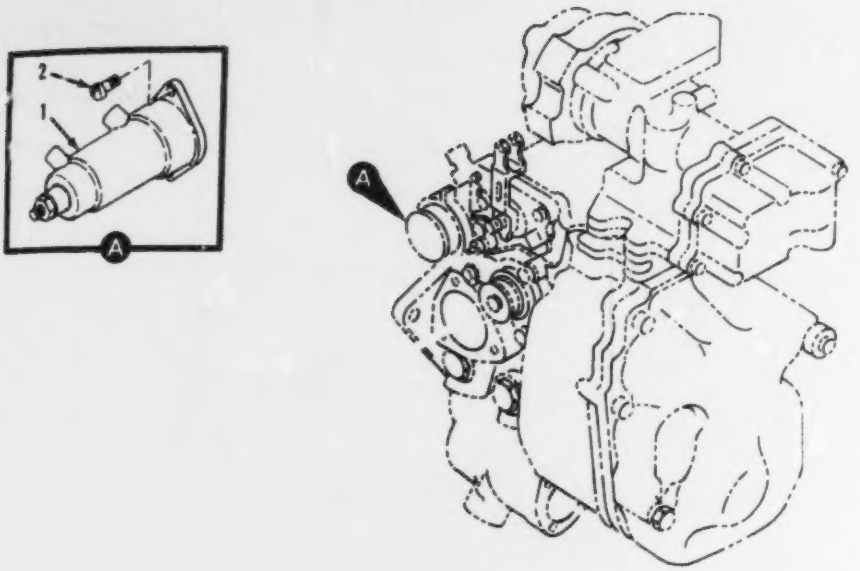
5-66. INSTALLATION OF FUEL CONTROL NOID VALVE (T53-L-7/7A Engines). (See f 5-20 and 5-21.) If a new valve and sleeve as (22, figure 5-20) is to be installed, proceed lowing step a. If original valve and sleeve a is to be installed, begin with following step b.

a. Install new valve and sleeve assembly without packings (18, 19, 20, and 21), into fu tor housing.

b. Using depth micrometer, measure (dimension A, figure 5-21) from fuel regu ing to top of valve and sleeve assembly. Re dimension.

c. Using depth micrometer, measure bo noid (dimension B).

d. Subtract dimension A from dimensio difference, minus 0.0000 to plus 0.0025 inch, quired shim thickness (dimension C). This correct pinch fit on valve and sleeve assem



1. Torque Limiter
2. Screw

Figure 5-19. Removal of Fuel Control Torque Limiter (T53-L-15)

Using sleeve puller (STD63557), remove valve sleeve assembly from fuel regulator housing.

NOTE

In following step f., one packing (18, figure 5-20) is installed on solenoid.

Install packings (18, 19, 20, and 21) on valve leeve assembly.

Coat packings with petrolatum (item 87, table nd install valve and sleeve assembly into fuel ator housing.

Install shim (17, figure 5-18).

CAUTION

In following step i., insert (23) incorporates retaining balls on its shaft. Use care to ensure that insert remains in solenoid. If it is necessary to install insert into solenoid, use extreme care to ensure that balls on insert do not spring free during installation. Loss of these balls will cause solenoid valve to function improperly.

Install solenoid (24) with insert (23) and secure crews (16).

Install solenoid support bracket (13) on solenoid cure bracket to fuel regulator with screws (26).

k. Secure bracket to solenoid with screw (14) and nut (15).

5-67. OPERATIONAL CHECK OF EMERGENCY (MANUAL) FUEL SYSTEM (T53-L-7/7A Engines).

Proceed as follows:

a. Start engine.

b. With fuel control selector switch in PRIMARY or AUTOMATIC position, stabilize engine at 70 percent N1 speed.

CAUTION

Do not move power lever with fuel selector switch in EMERGENCY (or MANUAL) position.

c. Move fuel control selector switch to EMERGENCY or MANUAL position.

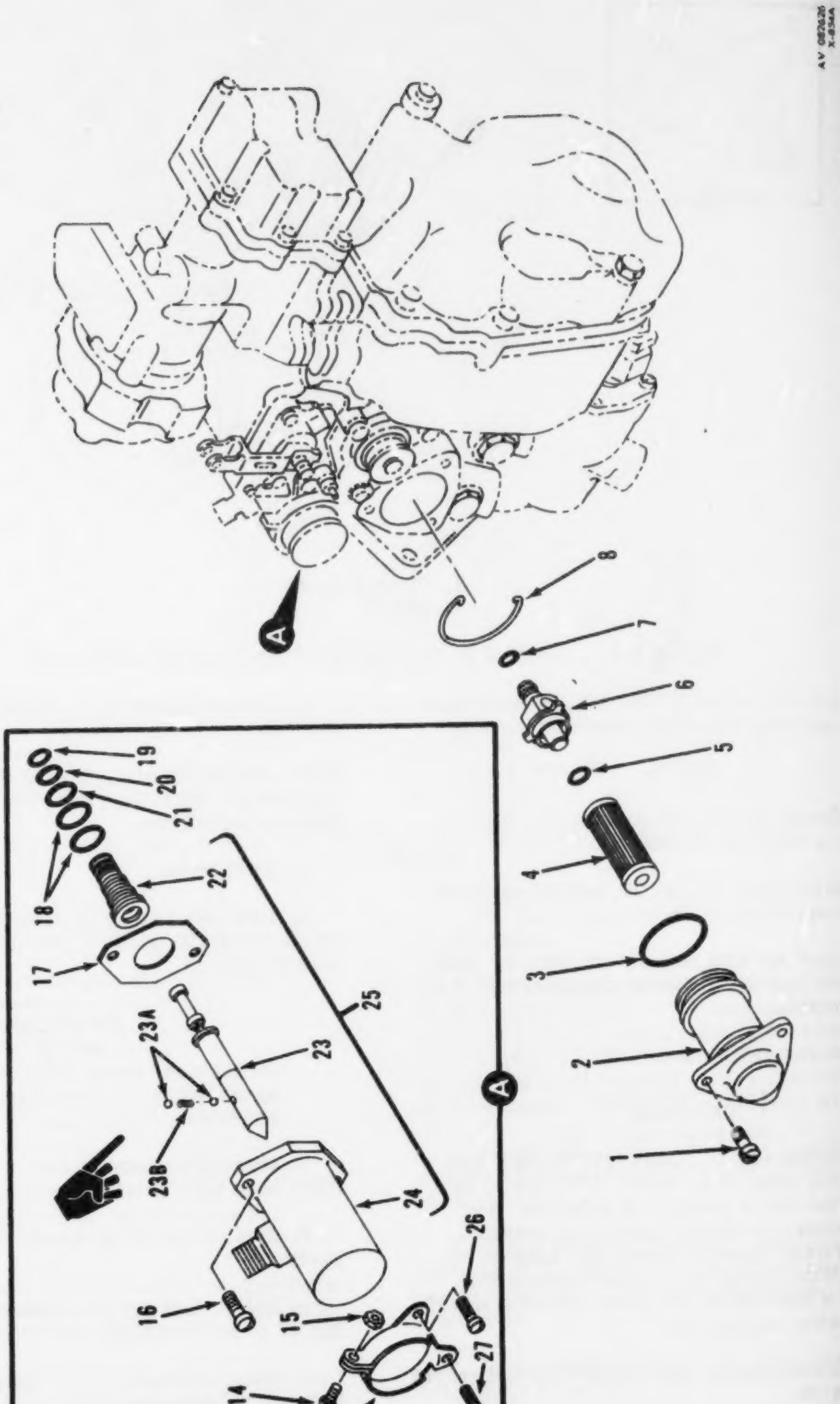
d. Note indicated N1 speed. It should drop 2 to 5 percent.

e. Return fuel control selector switch to PRIMARY or AUTOMATIC position within 5 seconds.

f. N1 speed should return to approximately 70 percent and then stabilize.

5-68. REMOVAL OF COVER AND PUMP DISCHARGE STRAINER AND SERVO SUPPLY FILTER (T53-L-7/7A Engines).

(See figure 5-20.) Proceed as follows: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Key to Figure 5-20.

rew
over and Pump Discharge
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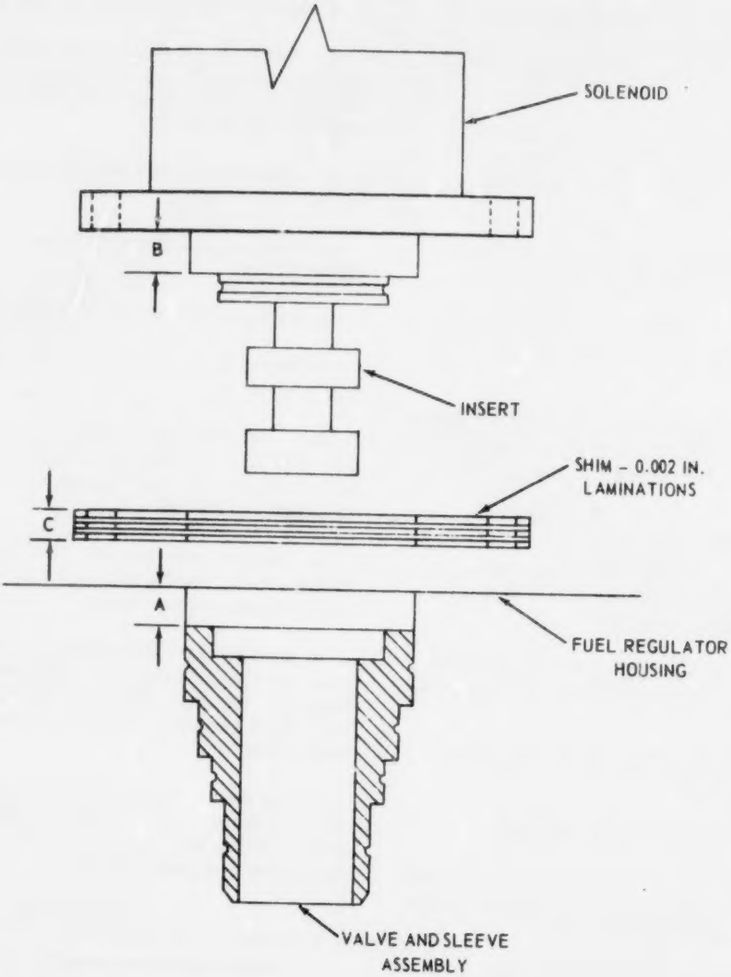
rvo Supply Filter Element
acking
ilter Housing
acking
etaining Ring
Deleted)
Deleted)

11. (Deleted)
12. (Deleted)
13. Solenoid Support Bracket
14. Screw
15. Nut
16. Screw
17. Shim
18. Packing
19. Packing
20. Packing

21. Packing
22. Valve and Sleeve Assembly
23. Insert
23A. Balls
23B. Spring
24. Solenoid
25. Solenoid and Valve Assembly
26. Screw
27. Screw


SOLENOID
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SHIM - 0.002 IN. LAMINATIONS
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FUEL REGULATOR HOUSING
VALVE AND SLEEVE ASSEMBLY

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Figure 5-21. Fuel Control Solenoid Valve - Shim Measurement (T53-L-7/7A)

a. Remove screws (1) from cover and pump discharge strainer (2) and withdraw assembly from fuel regulator.

b. Remove retaining ring (8) from rear groove of cover and pump discharge strainer (2).

c. Using twisting motion, carefully remove servo supply filter element (4) and filter housing (6). Separate filter element from housing.

d. Remove packing (3) from cover and pump discharge strainer (2).

e. Remove packing (7) from filter housing (6). Pull servo supply filter element (4) from housing and remove packing (5) from element.

5-69. MINOR SERVICING OF COVER AND PUMP DISCHARGE STRAINER AND SERVO SUPPLY FILTER (T53-L-7/7A Engines). (See figure 5-20.) Proceed as follows:

a. Inspect cover and pump discharge strainer (2) for cleanliness. Clean strainer with soft fiber brush and rinse with trichloroethylene (item 113, table 2-2).

b. Inspect cover and discharge strainer for damage. Replace cover and strainer only if they are damaged or marred.

c. Replace servo supply filter element (4) at each inspection.

5-70. INSTALLATION OF COVER AND PUMP DISCHARGE STRAINER AND SERVO SUPPLY FILTER (T53-L-7/7A Engines). (See figure 5-20.) Proceed as follows:

NOTE

> In following step a., install new servo supply filter element (4) and packings (5) from kit 1-200-030-27, if available.

a. Place packing (7) on filter housing (6). Install packing (5) in servo supply filter element (4) and push element over housing.

b. Slide servo supply filter into cover and pump discharge strainer (2).

c. Secure assembly with retaining ring (8).

d. Coat packing (3) with petrolatum (item 87, table 2-2), and place in groove adjacent to triangular flange on cover and pump discharge strainer (2).

e. Using twisting motion and proper alignment, install assembled cover into fuel regulator housing.

f. Secure cover with screws (1) and tighten quired. (Refer to table 11-3, reference numbe Lockwire screws.

5-71. REMOVAL OF FUEL INLET STRAINE SERVO FILTER AND STRAINER ASSEMBLY (L-15/701 Engines). (See figure 5-22.) Proce follows:

a. Remove screws (7) from strainer assem and withdraw assembly from fuel regulator.

b. Remove the flex retaining ring (3) by rot the servo filter assembly (2).

c. Separate the servo filter assembly (2) fr the strainer assembly (6).

d. Remove packings (1, 4, and 5) and discar

e. Unfasten the filter strap (8) from around strainer assembly (6) only when particles are between ID of the filter strap (8) and the OD of strainer assembly (6).

f. Disconnect hose assembly (14) from fuel fitting (12).

g. Remove screws (13) from fuel inlet fitting move fitting.

h. Remove packing (11) from fuel inlet fittin

i. Remove inlet strainer (10) and spring (9 fuel regulator.

5-72. MINOR SERVICING OF FUEL INLET ER AND SERVO FILTER AND STRAINER ASS BLY (T53-L-15/701 Engines). (See figure 5-2 Proceed as follows:

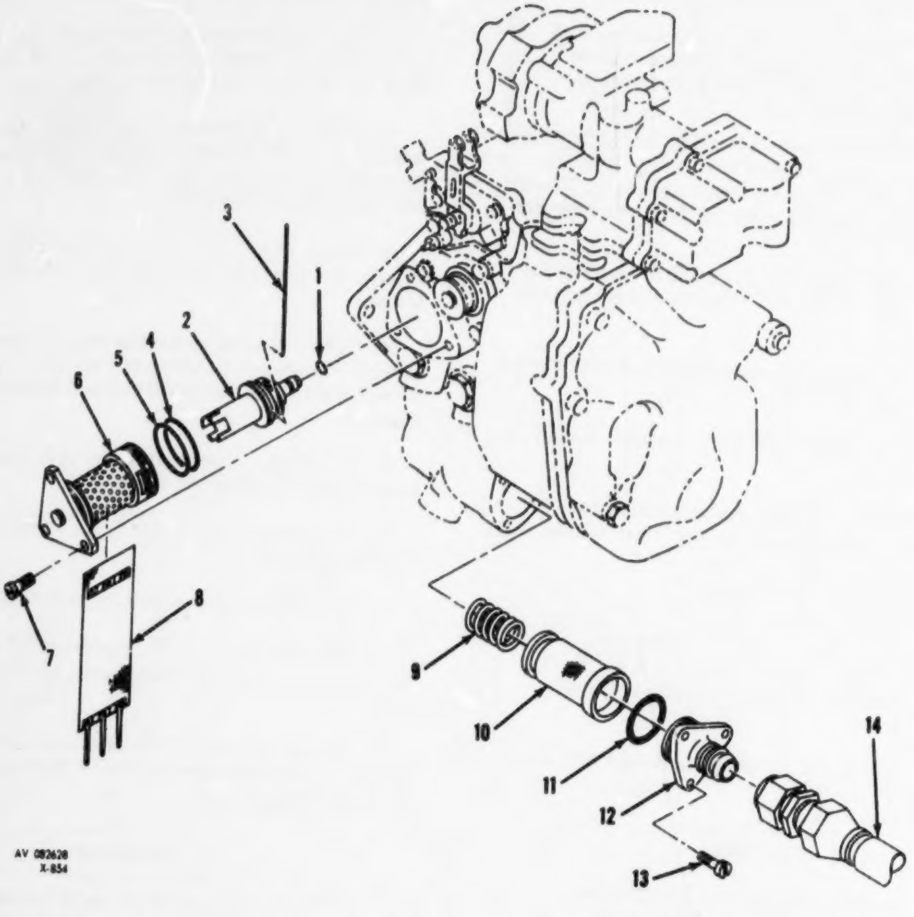
a. Inspect fuel inlet strainer (10) for clean Clean strainer with soft fiber brush and rinse drycleaning solvent (item 28, table 2-2). Air

b. Inspect fuel inlet strainer (10) for broke bent, or kinked mesh. Straighten kinks with fingers. Replace strainer only if it is damag red, or if cleaning does not completely remov tamination.

c. Inspect strainer assembly (6) and filter (8) for cleanliness. Immerse parts in drycle solvent (item 28, table 2-2). Dry parts using ture-free compressed air.

CAUTION

> Under no circumstances should the wa flow servo-filter assembly (2) be clea This filter assembly must be inspected and cleaned at depot maintenance only.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1. Packing
2. Wash Flow Servo Filter Assembly
3. Flex Retaining Ring
4. Packing
5. Packing
6. Strainer Assembly
7. Screw
8. Filter Strap
9. Spring
10. Inlet Strainer
11. Packing
12. Fuel Inlet Fitting
13. Screw
14. Hose Assembly

Figure 5-22. Removal of Fuel Inlet Strainer and Servo Filter and Strainer Assembly (T53-L-15/701)

5-73. INSTALLATION OF FUEL INLET STRAINER AND SERVO FILTER AND STRAINER ASSEMBLY

(T53-L-15/701 Engines). (See figure 5-22.) Proceed as follows:

a. Insert the servo filter assembly (2) into the strainer assembly (6).

CAUTION

In following step b. ensure that the ends of the flex retaining ring (3) are not visible through the accessory slot in the strainer assembly housing.

b. Place the hooked end of the flex retaining ring (3) into the acceptance hole of the servo filter assembly (2). Rotate the servo filter assembly (2) with the flex retaining ring (3) inserted with the ring circumventing the groove.

c. Coat new packings (1, 4, and 5) with petrolatum (item 87, table 2-2) and install on strainer assembly (6).

d. Carefully install the completed assembly into the fuel regulator housing.

e. Tighten the three hold down screws (7) and lockwire.

f. Coat packing (11) with petrolatum, (item 87, table 2-2). Position packing on fuel inlet fitting (12).

CAUTION

In following step g., install closed end of strainer first. The strainer will not function properly if installed in the reverse direction.

g. Install spring (9) and inlet strainer (10) into fuel regulator.

CAUTION

When compressing spring in following step h., ensure that spring and inlet strainer are seated properly. Improper seating can cause collapse of inlet strainer.

h. Using a suitable phenolic rod (approximately 1/4-inch diameter by 6 inches long), compress spring (9) by pushing against bottom of inlet strainer (10).

i. Position fuel inlet fitting (12) over rod. Using a twisting motion, seat fitting in housing. Secure fitting to housing using screws (13). Remove rod.

j. To ensure that strainer is not binding, compress spring with rod. If spring does not compress, remove screws (13) and repeat preceding step i.

k. Tighten screws (13) as required. (Refer to table 11-3, reference number 89.)

l. Reconnect hose assembly (14, figure 5- fuel inlet fitting (12).

5-74. REMOVAL OF TOPPING GOVERNOR (T L-7/7A/15 Engines). (See figures 5-23 and 5-

Proceed as follows:

a. Remove power-driven rotary (booster) from overspeed governor and tachometer dri sembly. (Refer to paragraph 5-112.)

b. Remove forward splined nut (1, figure 5- if any, from forward end of topping governor shaft (2) and record number of nuts.

c. Using 8-32 threaded rod, pull topping nor drive shaft through tube (5) and through governor and tachometer drive assembly. and discard packings (3).

d. Using same rod, remove rear splined if any, from topping governor (8). Record of nuts.

e. Open forward retaining ring (4) and taining ring toward center of tube (5). Push forward into topping governor and tachometer housing.

f. Disconnect connecting rod (19) from topping governor upper lever (11).

g. Disconnect drain line from forward topping governor.

h. Disconnect vapor return vent hose (7).

i. Remove screws (9), washers (10) and ture-sensing element line clamp as indicated ure 5-24.

j. Manually rotate fuel regulator condition arm counterclockwise against 0 degree STOP tion and hold.

CAUTION

The topping governor must be kept as level as possible while it is being removed to prevent damage to splines.

k. Carefully raise topping governor (3) ter inch. Check to ensure that condition lever gear will clear splined shaft in fuel control.

l. Lift topping governor free. Remove (4) from governor standpipe. Remove seal annular cavity in governor.

NOTE

Condition lever must be reindexed when topping governor is reinstalled on fuel control.

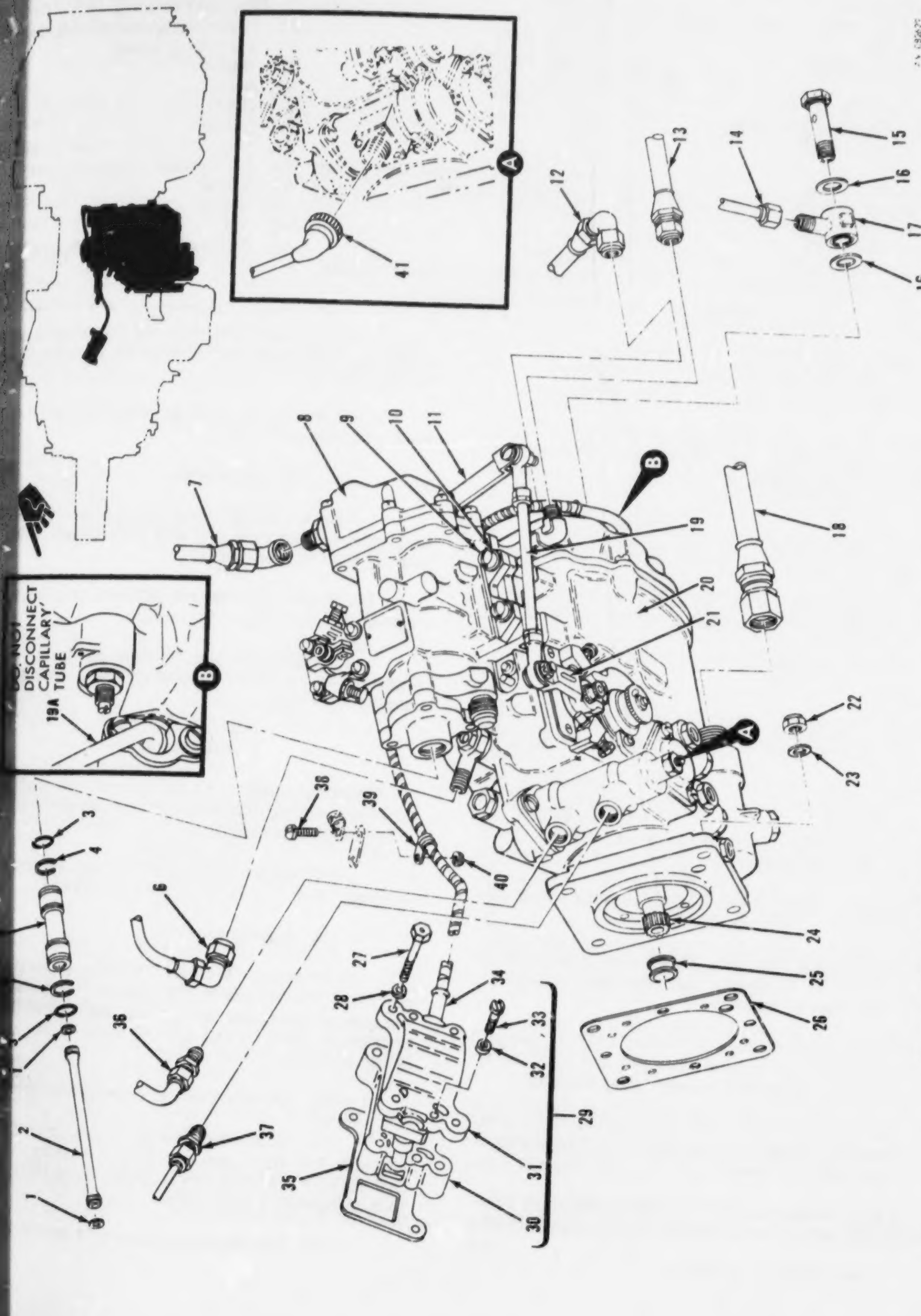
DO NOT DISCONNECT CAPILLARY TUBE
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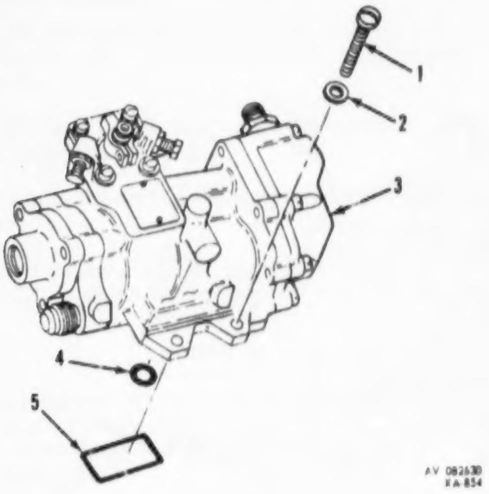
Figure 5-23. Fuel Regulator, Topping Governor, and Attaching Parts (T53-L-7/7A/15)

Key to Figure 5-23.

1. Splined Nut
2. Topping Governor Drive Shaft
3. Packing
4. Retaining Ring
5. Tube
6. Primer Fuel Hose
7. Vapor Return Vent Hose
8. Topping Governor
9. Screw
10. Washer
11. Topping Governor Upper Lever
12. Airbleed Actuator Air Pressure Hose
13. Main Fuel Hose
14. Air Pressure-Sensing Hose
15. Bolt
16. Gasket
17. Elbow
18. Fuel-In Hose
19. Connecting Rod
19A. Capillary Tube
20. Fuel Regulator
21. Power Lever
22. Nut
23. Washer
24. Splined Fuel Control Drive Shaft
25. Seal (T53-L-15/701)
26. Gasket
27. Bolt
28. Washer
29. Temperature-Sensing Element Housing Assembly
30. Lower Temperature-Sen Element Housing
31. Upper Temperature-Sen Element Housing
32. Washer
33. Screw
34. Cable
35. Gasket
36. Torque Limiter Tube As
37. Oil Pressure-Sensing Ho
38. Screw
39. Clamp
40. Nut
41. Wiring Harness (T53-L-



1. Screw
2. Washer
3. Topping Governor
4. Packing
5. Seal

Figure 5-24. Removal of Engine Topping Governor (T53-L-7/7A/15)

5-75. INSTALLATION OF TOPPING GOVERNOR (T53-L-7/7A/15 Engines). (See figures 5-23 and 5-24.) Proceed as follows:

a. Install new packings (3, figure 5-23) on tube (5) and insert tube into topping governor and tachometer drive housing. Push tube forward into housing.

b. Set condition lever arm at 0 degree STOP position. Release condition lever arm and note spring-back from external stop.

(1) If spring-back is less than 0.020 inch proceed as follows. (Refer to table 11-4, reference 85.)

(a) Remove lockwire.

(b) Loosen jam nut and back out sto a nominal 0.040 inch spring-back is obtained, tighten jam nut.

(2) If spring-back is between 0.060 and inch, proceed as follows:

(a) Remove lockwire.

(b) Loosen jam nut and screw in fu stop until a nominal 0. 040 inch spring-back i tained, then tighten jam nut.

(3) If spring-back is 0.080 inch or gre proceed as follows:

(a) Separate topping governor from regulator and reindex male splined shaft one counterclockwise.

CAUTION

Always rotate the regulator splined sh in a counterclockwise direction, never a clockwise direction.

(b) Back off fuel OFF stop screw nominal 0.040 inch spring-back is obtained.

(c) Tighten jam nut.

(4) Whenever the fuel OFF stop screw adjusted, it is mandatory to relocate the pos the topping governor index plate and readjust MAXIMUM RPM (FULL OPEN) external stop in the following order.

(a) Loosen index plate hold down s

(b) Hold condition lever arm firmly external fuel OFF stop and reposition index that fuel OFF scribe line on plate aligns wi line on condition lever arm.

(c) Tighten index plate hold down s

(d) Rotate condition lever arm against
IMUM RPM (FULL OPEN) external stop screw
readjust MAXIMUM RPM (FULL OPEN) screw
ign scribe line on index plate with scribe line
ndition lever arm.

(e) Lockwire screws.

(5) Since the connecting rod was removed
the main fuel control power lever, proceed as
ws:

(a) Engage connecting rod with topping gov-
upper lever, using bolt. Engage other end of
cting rod with power lever, using bolt.

(b) Pin topping governor upper lever to
hole in block on inside of topping governor.
figure 5-25.)

(c) Align "A" scribe on power lever with
hole on main fuel control index plate. Adjust
ngth by rotating end bearings.

NOTE

When power lever "A" scribe has been aligned with "A" hole in index plate, insert pin through slot in power lever and into hole in index plate. Adjust rod length as necessary. Tighten connecting rod nut.

WARNING

When final rod adjustment has been made, observe inspection holes in rod ends for complete thread coverage. "Daylight" shall not be visible through inspection holes. If readjustment is necessary, repeat preceding step (5) (c).

nstall packing (4, figure 5-24) on governor
ipe and rectangular rubber seal (5) in annular
in governor. Lubricate splines of governor
ulti-Fax EP2 (item 79, table 2-2). Position
or over splined shaft in fuel regulator.

NOTE

Ensure that the setting of the condition
lever arm is maintained while mating
he condition lever shaftgear with the
plined shaft.

ecure topping governor (8, figure 5-23) to fuel
tor (20) placing temperature-sensing element
amp under screw (9) as indicated in figure
Install three remaining screws (9, figure 5-23)
shers (10). Lockwire screws.

osition retaining ring (4) in after groove on
d pull tube aft until rearward motion is stop-
ring. Secure tube with second ring in forward
on tube.

NOTE

Engage the clevis bolt into the castle nut with the clevis bolt hole just protruding above the slot of the castle nut, then insert the cotter pin. This resultant assembly should be a loose fit. No torquing of the bolt and/or castle nut is allowed.

f. Secure connecting rod (19) and lockwire rod.

g. Determine end float of topping governor drive shaft (2). (Refer to paragraph 5-78.) Using 8-32 threaded rod insert splined nuts (1, figure 5-23), if required, through governor and tachometer drive housing, and covering tube, and into overspeed governor housing. Mesh splines and remove rod.

NOTE

In following step h., governor drive shaft spline may be meshed with spline of governor by slowly rotating power turbine.

h. Using 8-32 threaded rod insert either end of governor drive shaft through governor and tachometer drive housing and tube, into governor. Mesh splines and remove rod.

i. If required, install nuts on forward end of topping governor drive shaft with 8-32 threaded rod.

j. Install power-driven rotary (booster) pump. (Refer to paragraph 5-113.)

k. Connect vapor return vent hose (7, figure 5-23) to governor.

5-76. REMOVAL OF TOPPING GOVERNOR (T53-L-701 Engine). (Refer to paragraph 3-42.)

5-77. INSTALLATION OF TOPPING GOVERNOR (T53-L-701 Engine). (Refer to paragraph 9-30.)

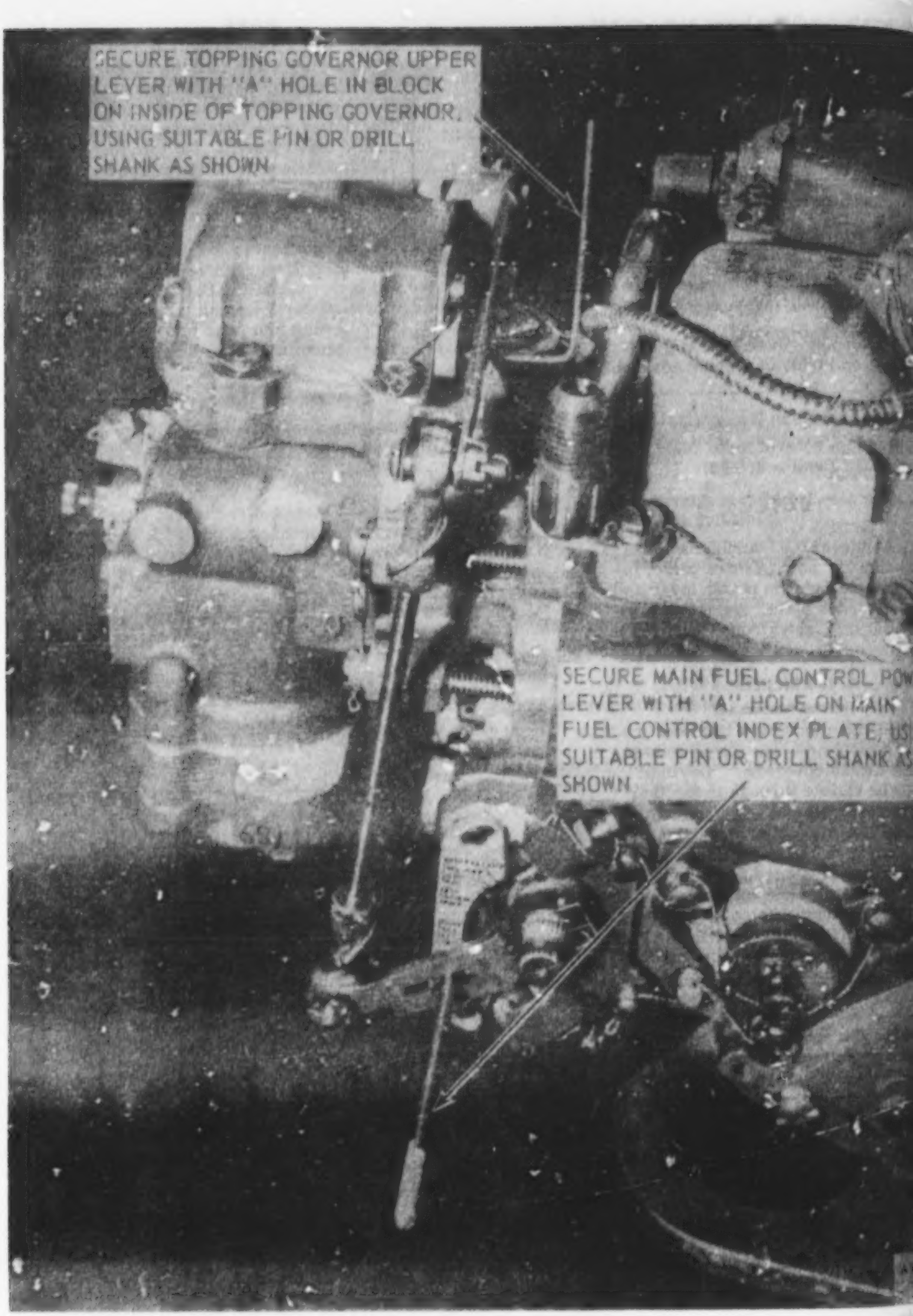
5-78. ESTABLISHING END FLOAT OF TOPPING GOVERNOR DRIVE SHAFT (T53-L-7/7A/15 Engines). (See figure 5-27.) When the power-driven rotary (booster) pump, topping governor, or fuel regulator is to be installed, the end float of the governor drive shaft must be established. Excessive end float can cause wear of the shaft splines and may lead to malfunction or failure of the governor.

a. Remove rotary (booster) pump. (Refer to paragraph 5-112.)

b. Remove splined nuts, if any, from forward end of governor drive shaft and record thickness.

c. Using rod, 8-32 threaded, pull governor drive shaft through drive shaft tube.

d. Using same rod, remove aft nuts, if any, from overspeed governor housing. Record thickness of nuts.



SECURE TOPPING GOVERNOR UPPER LEVER WITH "A" HOLE IN BLOCK ON INSIDE OF TOPPING GOVERNOR, USING SUITABLE PIN OR DRILL SHANK AS SHOWN

SECURE MAIN FUEL CONTROL POW
LEVER WITH "A" HOLE ON MAIN
FUEL CONTROL INDEX PLATE, US
SUITABLE PIN OR DRILL SHANK AS
SHOWN

Figure 5-25. Aligning Power Lever "A" Scribe with "A" Hole in Index Plate

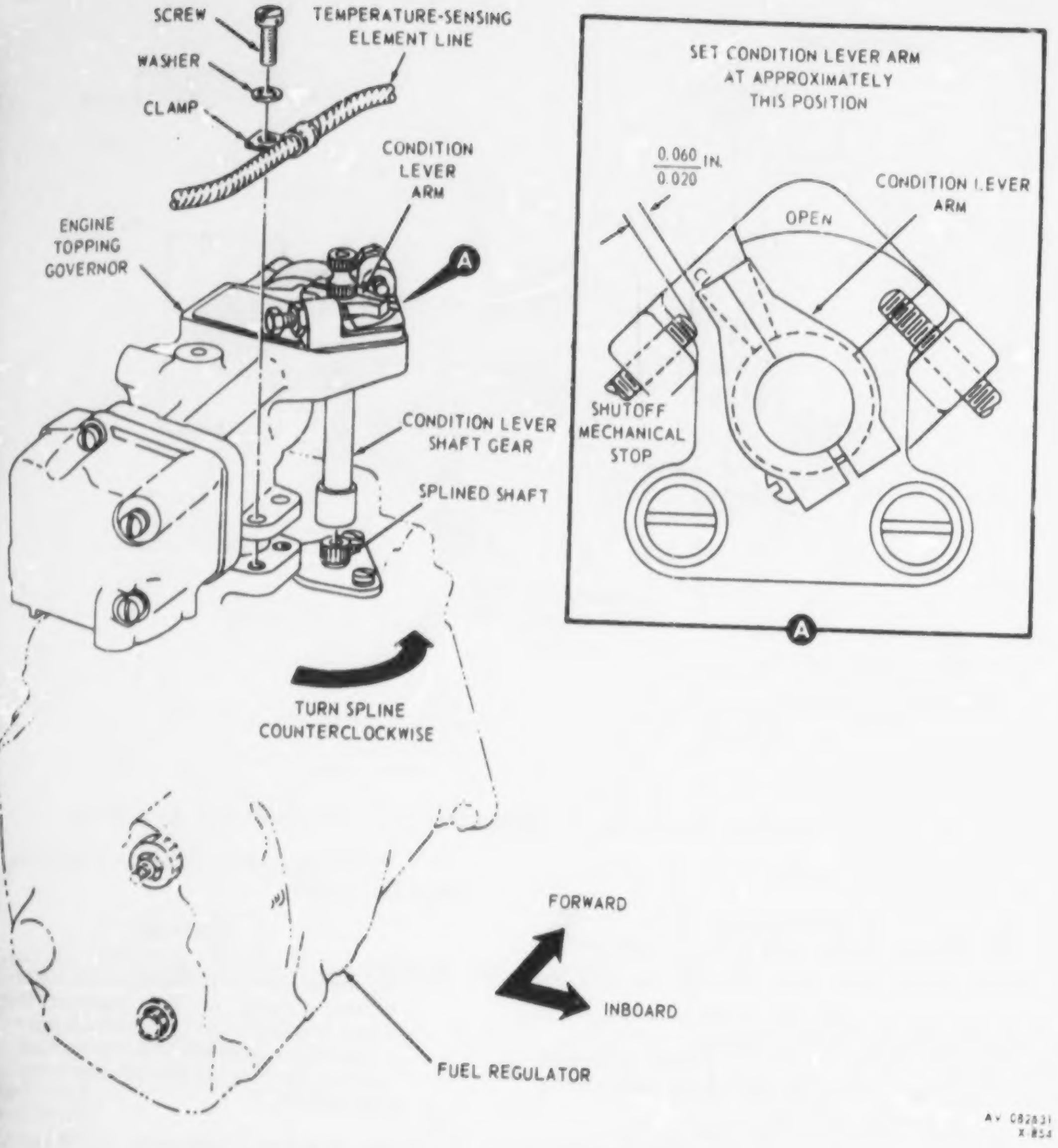

SCREW
TEMPERATURE-SENSING ELEMENT LINE
WASHER
CLAMP
CONDITION LEVER ARM
ENGINE TOPPING GOVERNOR
A
CONDITION LEVER SHAFT GEAR
SPLINED SHAFT
TURN SPLINE COUNTERCLOCKWISE
FORWARD
INBOARD
FUEL REGULATOR
SET CONDITION LEVER ARM AT APPROXIMATELY THIS POSITION
0.060 / 0.020 IN.
CONDITION LEVER ARM
OPEN
SHUTOFF MECHANICAL STOP
A
AV 082831
X 854

Figure 5-26. Topping Governor - Installation (T53-L-7/7A/15)

. Reinstall governor drive shaft and push as far governor housing as possible.

Measure and note (in thousandths of an inch) nce indicated as "A" in figure 5-27.

Using depth micrometer, measure and note (in andths of an inch) dimension "B" in figure 5-27.

Subtract dimension "A" from "B". This will ate total existing end float.

CAUTION

Minimum end float tolerance is not established; however, it is important that some end float exists to preclude jamming of the governor drive shaft against the housing and booster pump splined shaft.

i. If end float is less than 0.090 inch, do not shim drive shaft.

j. If end float is between 0.090 and 0.280 inch, install one splined nut at fuel control (aft) end of drive shaft.

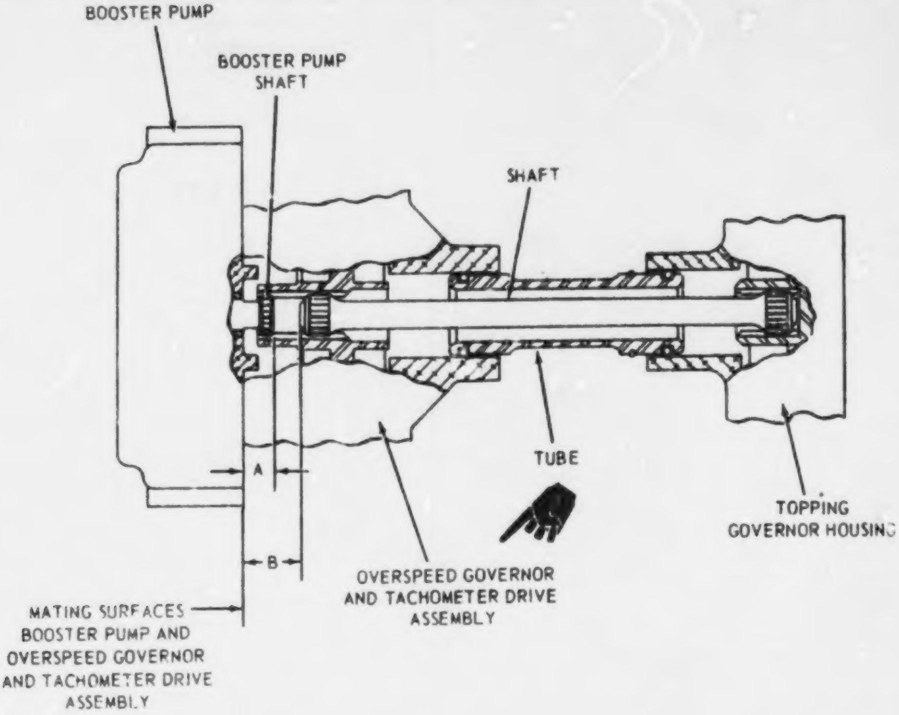

BOOSTER PUMP
BOOSTER PUMP SHAFT
SHAFT
A
B
TUBE
TOPPING GOVERNOR HOUSING
OVERSPEED GOVERNOR AND TACHOMETER DRIVE ASSEMBLY
MATING SURFACES BOOSTER PUMP AND OVERSPEED GOVERNOR AND TACHOMETER DRIVE ASSEMBLY

Figure 5-27. End Float Adjustment of Topping Governor Drive Shaft (T53-L-7/7A/15)

NOTE

Nut used during installation is 1-160-589-02. The number of nuts required is either none, one, or four.

k. If end float is more than 0. 280 inch, install two shim nuts at each end of drive shaft.

kA. Alternate method of performing end float adjustment, proceed as follows:

(1) Temporarily install fuel control on accessory drive gearbox without inserting tube (5, figure 5-23).

(2) Install clamping tool (LTCT14503) onto topping governor drive shaft so it rests on mating face of overspeed governor and tachometer drive assembly housing. (See figure 5-27A.)

(3) With tool securely attached to shaft, push shaft as far into overspeed governor housing as possible.

(4) Measure and record the distance between mating face of overspeed governor and tachometer drive assembly housing and tool surface (A, figure 5-27A).

(5) If end float is less than 0. 090 inch, shim drive shaft.

CAUTION

Minimum end float tolerance is not established; however, it is important that some end float exist to preclude jamming the topping governor drive shaft against the housing and booster pump splined shaft.

(6) If end float is between 0. 090 and 0.2 inch, install one splined nut (1, figure 5-23) at control (aft) end of drive shaft.

(7) If end float is more than 0. 280 inch, two splined nuts (1) at each end of drive shaft.

(8) Remove clamping tool (LTCT1450 fuel control.

l. Proceed with installation of topping gov fuel control, or rotary (booster) pump.

5-79. REMOVAL OF FUEL CONTROL (T53-L 15 Engines). (See figure 5-23.) The fuel reg (20) and the topping governor (8) may be rem an assembly.

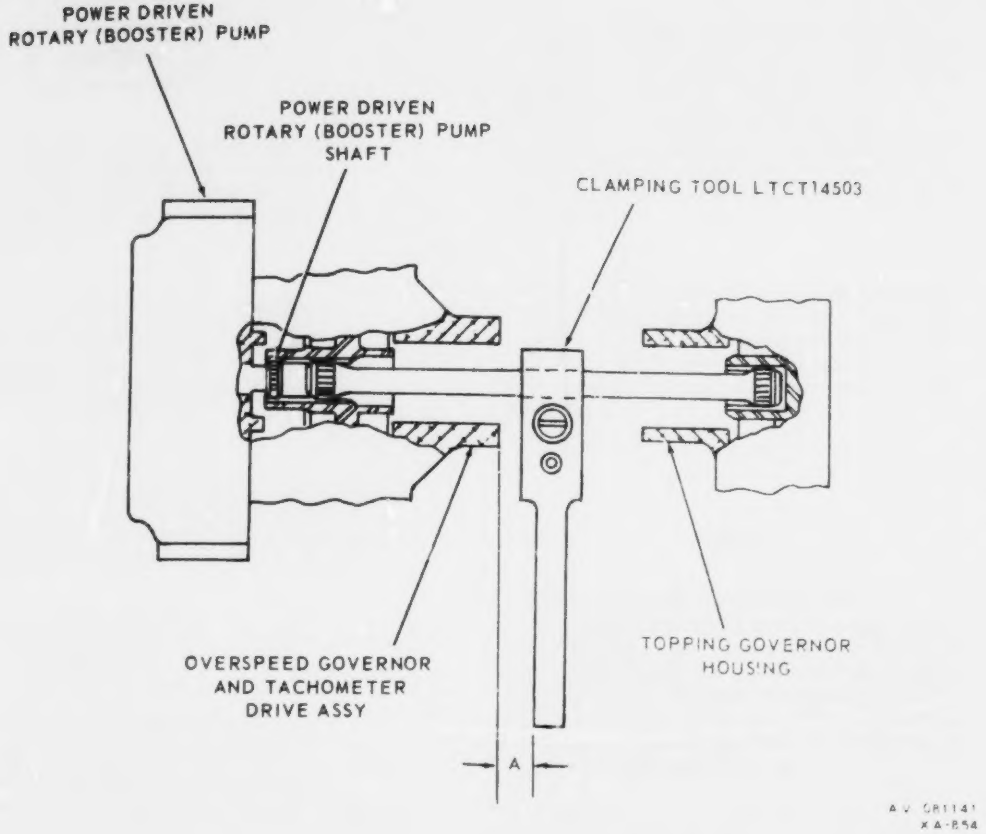

POWER DRIVEN
ROTARY (BOOSTER) PUMP
POWER DRIVEN
ROTARY (BOOSTER) PUMP
SHAFT
CLAMPING TOOL LTCT14503
OVERSPEED GOVERNOR
AND TACHOMETER
DRIVE ASSY
TOPPING GOVERNOR
HOUSING
A
AV 081141
XA-854

Figure 5-27A. Alternate Method of End Float Adjustment of Topping Governor Drive Shaft (T53-L-7/7A/15)

WARNING

Ensure that all electrical power is disconnected.

**a. On T53-L-15 engines loosen cylinder 1 and 2
"B" nuts. (See figure 5-86A.) Move inlet guide
actuator to vane full open position and record
ble inlet guide vane position on fuel control indi-
plate. Do not remove levers. Disconnect rod**

**Disconnect and tag all electrical, air, and fuel
ections. (See figure 5-23.)**

**On T53-L-15 engines, remove screw (38) and
0) that secures clamp (39) to bracket.**

d. Remove bolts (27) and washers (28) that secure temperature-sensing element housing assembly (29) and gasket (35). Remove housing and gasket.

e. Perform procedures outlined in steps a. through g., paragraph 5-74.

f. For all T53-L-15 engines and for T53-L-7/7A engines with fuel control, P/N 81500B4, or P/N 81500B5 with a long driven splined shaft, perform the following. (Refer to paragraph 5-129.)

(1) Cut lockwire and remove two bolts which secure the ignition spark splitter mount bracket to air diffuser.

(2) Move splitter to eliminate its interference with aft movement of fuel control during removal.

g. Support fuel control and remove nuts (22, figure 5-23) and washers (23).

Withdraw the assembly, keeping it as level as possible to prevent damage or distortion to splined fuel control drive shaft (34). Remove gasket (26).

CAUTION

Extreme care shall be taken to ensure that the temperature-sensing element fins are not bent or distorted during handling. Excessively damaged or bent fins can cause the fuel control to operate incorrectly.

The temperature-sensing element and capillary tube are calibrated to the fuel control. Do not disconnect capillary tube (19A, figure 5-23) from the fuel control. The temperature-sensing assembly shall be removed along with the fuel control.

Remove screws (33) and washers (32). Carefully separate upper temperature-sensing element housing (31) from lower temperature-sensing element housing (30). Retain packings for installation of temperature-sensing element with fuel control.

CAUTION

The fuel control is considered a high value item and is easily damaged when not properly packaged for shipment. Package fuel control for shipment as outlined in paragraph 3-22.

When a fuel control assembly has been removed from engine and is not to be reinstalled within 48 hours, preserve in accordance with instructions in paragraph 3-21.

INSTALLATION OF FUEL CONTROL L-7/7A Engines). (See figures 5-23 and 5-28.) Proceed as follows.

NOTE

When accessory drive gearbox 1-080-250-13 is installed, a fuel control, P/N 81500B4, 81500B6, or 81500B7, with a long-driven splined shaft and special seal 1-300-368-01 must be installed. If an accessory drive gearbox other than the 1-080-250-13 is installed, it is permissible to use a fuel control with either a long- or short-driven splined shaft. If a fuel control with a long-driven spline is used, remove seal (1-300-368-01) from shaft assembly.

CAUTION

Under no circumstances will a fuel regulator with a short splined shaft replace a fuel regulator with a long splined shaft on accessory drive gearbox 1-080-250-13, 1-080-250-14, or 1-080-250-16. Accessory drive gearbox 1-080-250-13, 1-080-250-14, or 1-080-250-16 may be identified by the addition of a dowel pin on the fuel regulator mount pad. This pin must not be removed.

The capillary tube of the temperature-sensing assembly is connected to the fuel control. Use extreme care to avoid damage to the tube. Do not separate the tube from the fuel control. Do not damage packings on temperature-sensing element.

NOTE

TOP is vibropeened on the end of the temperature-sensing element. This marking is to establish proper location of fins when installing and must face the upper temperature housing cover for the element to function properly. The curved ends of the fins will face inboard toward centerline of engine and the milled flat on the end of element will be up.

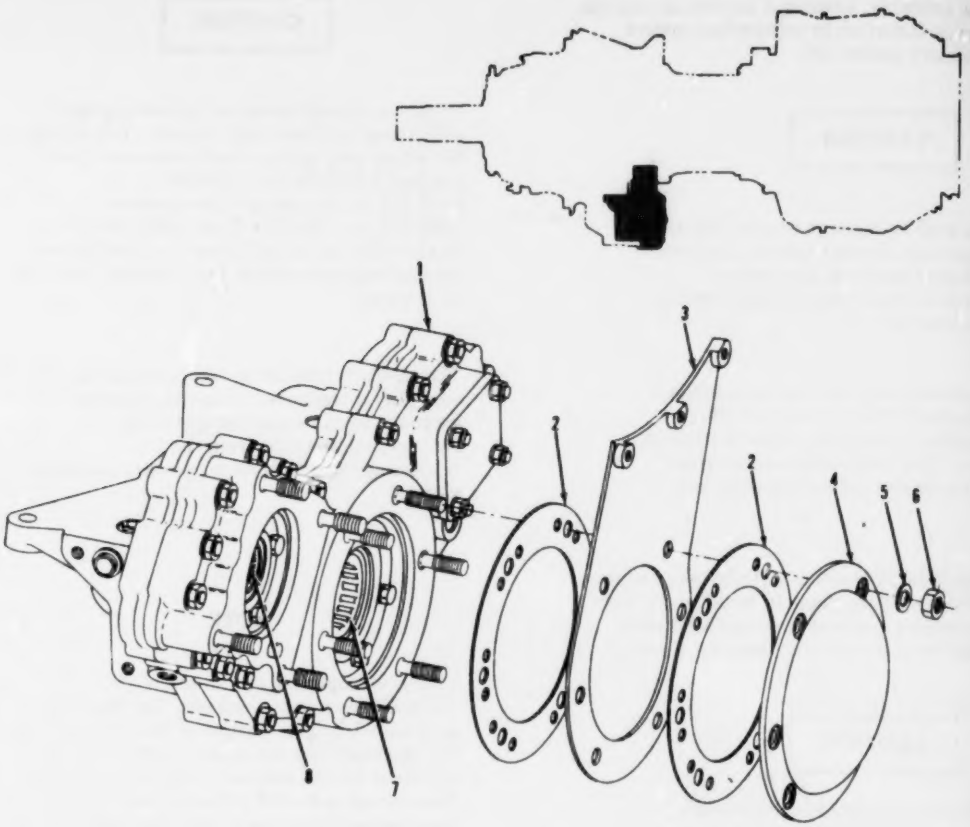
a. Position upper and lower temperature-sensing element housings (31, and 30, figure 5-23) over temperature-sensing element and carefully align halves with packing. Secure with screws and washers (33 and 32). Tighten screws as required and lockwire.

b. Install gasket (26) on fuel control mounting pad of accessory drive gearbox.

c. Deleted.

CAUTION

In following step d, use caution when installing fuel control to prevent damage to the drive shaft carbon seal. If carbon seal is damaged, serious fuel leakage could occur.



1. Accessory Drive Gearbox
2. Gasket
3. Support
4. Cover
5. Washer
6. Nut
7. Outer Driven Gear
8. Fuel Control Drive Shaftge

Figure 5-28. Starter Generator Pad and Attaching Parts (T53-L-7/7A/15)

NOTE

> In following step d., to mesh the splines of the fuel control with the fuel control drive shaftgear (8, figure 5-28), remove the N1 tachometer generator and, with a 1/4-inch square drive extension and ratchet, rotate the tachometer drive gear until fuel control drive shaftgear splines mesh with splines on fuel control. Reinstall tachometer generator.

d. Place fuel control assembly on accessory drive gearbox pad, inserting splined fuel control drive shaft (24, figure 5-23) in the accessory drive gearbox.

e. Secure fuel control assembly to studs on accessory drive gearbox with washers (23) and nuts (22).

f. If fuel control, P/N 81500B4, P/N 81500B6, or P/N 81500B7, with a long-driven splined shaft has been removed, perform the following: (Refer to paragraph 5-132.)

(1) Reinstall splitter mount bracket and with two bolts.

(2) Install lockwire.

g. Perform procedures in steps e. and g. th j., paragraph 5-78.

h. Connect all electrical, fuel, and air lines secure temperature-sensing element housing ure 5-23) and gasket (35) to inlet housing with ers (28) and bolts (27). Tighten bolts. (Refer t 11-3, reference number 68.) Lockwire bolts. cotter pin through bolt that secures inlet guide actuator feedback tube assembly to fuel control and secure with lockwire.

i. Apply aircraft boost pump pressure to trol assembly and observe for fuel leakage, at mount pad drain. If leakage is observed, re fuel control assembly and return to next higher category for disposition or repair.

j. Install power-driven rotary (booster) pump. fer to paragraph 5-113.)

k. Perform bleed band closure check. (Refer to paraph 5-159B).

1. INSTALLATION OF FUEL CONTROL (T5̄3-L- Engines). (See figures 5-23 and 5-28.) Proceed ollows:

CAUTION

The temperature-sensing element and capillary tube are calibrated to the fuel control. Assure that capillary tube has not been disconnected from the fuel control. The temperature-sensing assembly shall be installed along with the fuel control. Use extreme care to avoid damage to the tube. Do not separate the tube from the fuel control.

Position temperature-sensing element in housing so that the bend in the forward vanes is toward the lower housing and away from the fuel control. Improper installation will cause tne fuel control to operate incorrectly.

. Position upper and lower temperature-sensing ment housings (31 and 30, figure 5-23) over temture-sensing element and carefully align halves packing. Secure with screws and washers (33 32). Tighten screws as required and lockwire.

. Install gasket (26) on fuel control mounting pad ccessory drive gearbox.

CAUTION

In following step c., use caution when installing fuel control to prevent damage to the drive shaft carbon seal. If carbon seal is damaged, serious fuel leakage could occur.

. Install new seal (25). Place fuel control asbly on accessory drive gearbox pad, inserting ed fuel control drive shaft (24) into accessory gearbox.

NOTE

In following step d. to mesh the splines of the fuel control with the fuel control drive shaftgear (8, figure 5-28) remove the N1 tachometer generator and, with a 1/4-inch square drive extension and ratchet, rotate the tachometer drive gear until fuel control drive shaftgear splines mesh with splines on fuel control. Reinstall tachometer generator.

Secure fuel control assembly to studs on acory drive gearbox with washers (23, figure 5-23) nuts (22). Tighten nuts as required. (Refer to 11-3, reference number 90.)

e. Install lead and coil assembly mount bracket and secure with two bolts. Lockwire bolts. (Refer to paragraph 5-132.)

f. Perform procedures in steps e. and g. through j., paragraph 5-78.

g. Connect all electrical, fuel, and air lines and secure temperature-sensing element housing assembly (29, figure 5-23) and gasket (35), to inlet housing with washers (28) and bolts (27).

NOTE

If the fuel control is a new replacement, adjust variable inlet guide vane feedback rod ends until variable inlet guide vane indicator aligns with the zero degree marking.

h. If same fuel control is being installed, position inlet guide vane actuator to vane full open position. Adjust feedback rod ends until indicator on fuel control aligns with previously noted position.

hA. Connect variable air inlet guide vane feedback tube (6, figure 5-28A) to fuel control as follows:

(1) Install washer (4) on bolt (7) and insert bolt through rod end bearing (5).

(2) Install washer (4) on bolt (7) and insert bolt in opening in fuel control arm (1).

NOTE

Ensure that one washer (4) is installed on each side of rod end bearing (5).

(3) Install washer (4) on bolt (7).

NOTE

Use a quantity of washers (4) as required to obtain a minimum clearance between nut (3) and pin (2).

(4) Install nut (3) on bolt (7) and tighten as required.

(5) Secure nut (3) with cotter pin (2).

NOTE

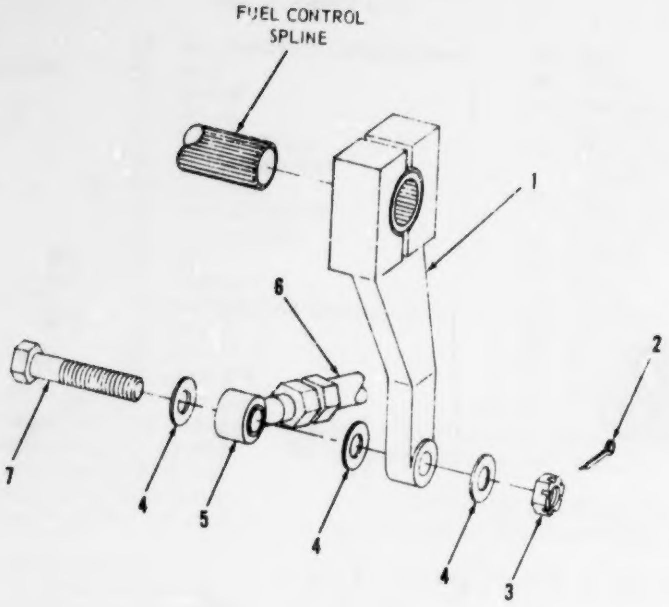
The bolt (7) must be free to rotate about its axis.

i. Secure clamp (39, figure 5-23) to bracket with screw (38) and nut (40).

j. Apply aircraft boost pump pressure to fuel control assembly and observe for fuel leakage, especially at mount pad drain. If leakage is observed, remove fuel control assembly and return to next higher category for disposition or repair.

k. Install power-driven rotary (booster) pump. (Refer to paragraph 5-113.)

l. Perform bleed band closure check. (Refer to paragraph 5-159B).



1. el Control Arm
2. tter Pin
3.
4. Washers
5. Rod End Bearing
6. Feedback Linkage Tube
7. Bolt

5-28A. Attaching Feedback Linkage Tube to Fuel Control Arm (Viewed From Engine Left Side Rear)

EMOVAL OF FUEL CONTROL (T53-L-701 (See figure 5-29.) The fuel regulator (20) pping governor (8) may be removed as an .

WARNING

ure that all electrical power is disnected.

en cylinder 1 and 2 hose "B" nuts. (See 6A.) Move inlet guide vane actuator to open position and record variable inlet e position on fuel control indicator plate. move levers. Disconnect rod ends.

connect and tag all electrical, air, and fuel ns.

move screw (36) and nut (38) that secures 7) to bracket.

move bolts (27) and washers (28) that secure re-sensing element housing assembly (29) t (35). Remove housing and gasket.

n forward retaining ring (4) and slide reg toward center of tube (5). Push tube foroverspeed governor and tachometer drive housing.

f. Cut lockwire and remove two bolts and secure ignition lead and coil assembly mount bracket to air diffuser. (Refer to paragraph 5-131.) Move splitter to eliminate its interference with aft movement of fuel regulator during removal.

g. Support fuel control assembly and remove nuts (22, figure 5-29) and washers (23).

h. Withdraw assembly, keeping it as level as possible to prevent damage to seal (25). Remove gasket (26).

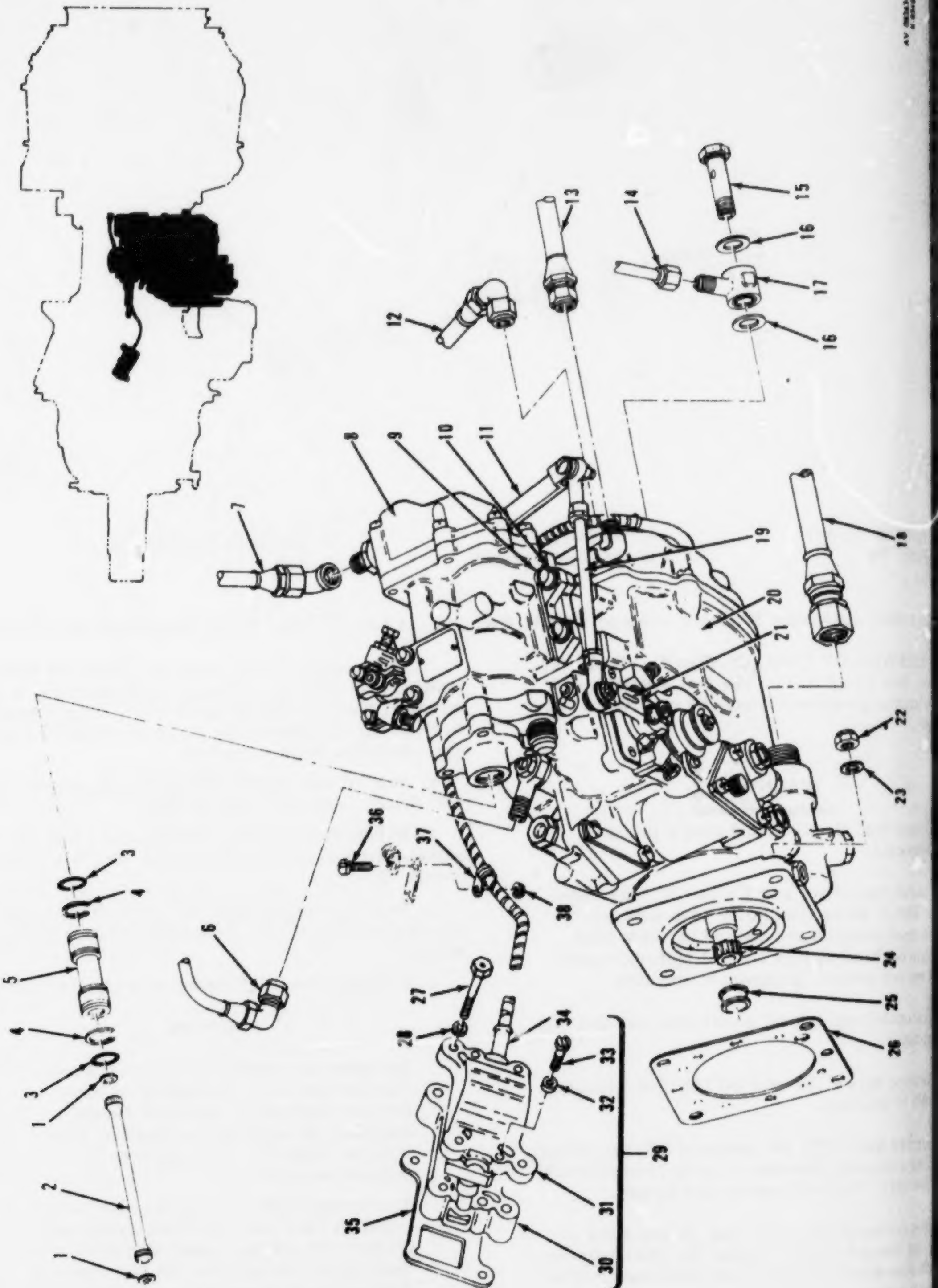
i. Remove topping governor drive shaft (2) and remove nuts (1), if any, from shaft. Record thickness of nuts.

j. Remove tube (5). Remove packings (3) from tube.

CAUTION

Extreme care shall be taken to ensure that the temperature-sensing element fins are not bent or distorted during handling. Excessively damaged or bent fins can cause the fuel regulator to operate incorrectly.

The temperature-sensing element and capillary tube are calibrated to the fuel control. Do not disconnect capillary tube (see figure 5-29A) from the fuel control. The temperature-sensing assembly shall be removed along with the fuel control.



Key to Figure 5-29.

plined Nut
opping Governor Drive Shaft
acking
taining Ring
ube
rimer Fuel Hose
apor Return Vent Hose
opping Governor
rew
asher
opping Governor Upper Lever
rbleed Actuator Air
essure Hose
in Fuel Hose

14. Air Pressure-Sensing Hose
15. Bolt
16. Gasket
17. Elbow
18. Fuel-In Hose
19. Connecting Rod
19A. (Deleted)
20. Fuel Regulator
21. Power Lever
22. Nut
23. Washer
24. Splined Fuel Control Drive Shaft
25. Seal
26. Gasket

27. Bolt
28. Washer
29. Temperature-Sensing Element Housing Assembly
30. Lower Temperature-Sensing Element Housing
31. Upper Temperature-Sensing Element Housing
32. Washer
33. Screw
34. Cable
35. Gasket
36. Screw
37. Clamp
38. Nut

Remove screws (33) and washers (32). Care-
eparate upper temperature-sensing element
ng (31) from lower temperature-sensing ele-
housing (30). Retain housings for installation
nperature-sensing element with fuel control.

When a fuel control assembly has been re-
from an engine and is not to be reinstalled
48 hours, preserve in accordance with in-
ions in paragraph 3-21.

INSTALLATION OF FUEL CONTROL (T53-L-
gines). (See figures 5-29 and 5-28.) Proceed
ows:

Before installation of fuel control assembly,
ish end float of topping governor drive shaft
re 5-29) as follows:

(1) Install topping governor drive shaft into
eed governor and tachometer drive assembly
g. Do not install tube (5) at this time.

2) Temporarily install fuel control by position-
ket (26) on fuel control mounting pad of acces-
ive gearbox. Place fuel control assembly on
ory drive gearbox pad, inserting splined fuel
drive shaft (24) into accessory drive gearbox.

NOTE

o mesh the splines of the fuel control
ith the fuel control drive shaftgear (3,
igure 5-28), remove the N1 tachometer
enerator and, with a 1/4-inch square
rive extension and ratchet, rotate the
achometer drive gear until fuel control
rive shaftgear splines mesh with splines
n fuel control. Reinstall tachometer
enerator. Governor drive shaft spline
ay be meshed with spline of governor
slowly rotating power turbine.

) Secure fuel control assembly to studs on
ry drive gearbox with washers (23, figure
d nuts (22).

) Push topping governor drive shaft aft as
governor housing as possible.

(5) Attach "C" clamp to shaft and zero dial indicator against "C" clamp.

(6) Slide shaft forward into overspeed governor and tachometer drive assembly as far as possible.

(7) Take reading on dial indicator.

CAUTION

Minimum end float tolerance is not established; however, it is important that some end float exists to preclude jamming of the governor drive shaft.

(8) If end float is less than 0.090 inch, splined nuts (1, figure 5-29) are not required on drive shaft.

(9) If end float is between 0.090 and 0.280 inch, one nut is required at fuel control (aft) end of topping governor drive shaft.

NOTE

Nut used during installation is 1-160-589-02. The number of nuts required is either none, one, or four.

(10) If end float is more than 0.280 inch, two nuts are required at each end of topping governor drive shaft.

(11) Remove dial indicator and "C" clamp.

(12) Support fuel control assembly and remove nuts (22) and washers (23).

(13) Withdraw assembly, keeping it as level as possible to prevent damage or distortion to splined fuel control drive shaft (24) and to topping governor drive shaft (2). Remove gasket (26).

b. Remove topping governor drive shaft (2) and install required number of nuts on shaft as determined in preceding steps (4) through (11).

c. Install retaining ring (4) and new packings (3) on tube (5), and insert tube and topping governor drive shaft (2) into overspeed governor and tachometer drive assembly housing.

CAUTION

The temperature-sensing element and capillary tube are calibrated to the fuel control. Assure that capillary tube has not been disconnected from the fuel control. The temperature-sensing assembly shall be installed along with the fuel control. Use extreme care to avoid damage to the tube. Do not separate the tube from the fuel control.

Position temperature-sensing element in housing so that the bend in the forward vanes is toward the lower housing and away from the fuel control. Improper installation will cause the fuel control to operate incorrectly.

d. Position upper and lower temperature-sensing element housings (31 and 30), over temperature-sensing element and carefully align halves with packings. Secure with screws and washers (33 and 32). Tighten screws as required and lockwire.

e. Install new gasket (26) on fuel control mounting pad of accessory drive gearbox.

CAUTION

In following step f. use caution when installing fuel control to prevent damage to the drive shaft carbon seal. If carbon seal is damaged, serious fuel leakage could occur.

NOTE

In following step f. to mesh the splines of the fuel control with the fuel control drive shaftgear (8, figure 5-28), remove the N1 tachometer generator and, with a 1/4-inch square drive extension and ratchet, rotate the tachometer drive gear until fuel control drive shaftgear splines mesh with splines on fuel regulator. Reinstall tachometer generator. Governor drive shaft spline may be meshed with spline of governor by slowly rotating power turbine.

f. Install new seal (25, figure 5-29). Place fuel control assembly on accessory drive gearbox pad, inserting splined fuel control drive shaft (24) into accessory drive gearbox.

g. Secure fuel control assembly to studs on accessory drive gearbox with washers (23, figure 5-29) and nuts (22). Tighten nuts. (Refer to table 11-3, reference number 90.)

h. Install lead and coil assembly mounting bracket and secure with two bolts. Lockwire bolts. (Refer to paragraph 5-132.)

i. Connect all electrical, fuel, and air li secure temperature-sensing element housin bly (29, figure 5-29) and gasket (35), to inle with washers (28) and bolts (27). Lockwire

NOTE

If the fuel control is a new replac adjust variable inlet guide vane fe rod ends until variable inlet guide indicator aligns with the zero degre marking.

j. If same fuel control is being installed inlet guide vane actuator to vane full open Adjust feedback rod ends until indicator on trol aligns with previously noted position.

jA. Connect variable air inlet guide van tube (6, figure 5-28A) to fuel control as fol

(1) Install washer (4) on bolt (7) and bolt through rod end bearing (5).

(2) Install washer (4) on bolt (7) and bolt in opening in fuel control arm (1).

NOTE

Ensure that one washer (4) is install on each side of rod end bearing (5).

(3) Install washer (4) on bolt (7).

NOTE

Use a quantity of washers (4) as requ to obtain a minimum clearance betw nut (3) and pin (2).

(4) Install nut (3) on bolt (7) and tig required.

(5) Secure nut (3) with cotter pin (2).

NOTE

The bolt (7) must be free to rotate about its axis.

k. Secure clamp (37, figure 5-29) to brac screw (36) and nut (38).

l. Apply aircraft boost pump pressure t trol assembly and observe for fuel leakage, at mounting pad drain. If leakage is observe fuel control assembly and return to next hig category for disposition or repair.

5-84. FUEL CONTROL PRIMING. Fuel co priming is to be performed only if fuel co bly has been preserved or replaced.

a. Rig power and condition levers. (Refe plicable airframe manual.)

b. Disconnect 28-vdc power supply from unit.

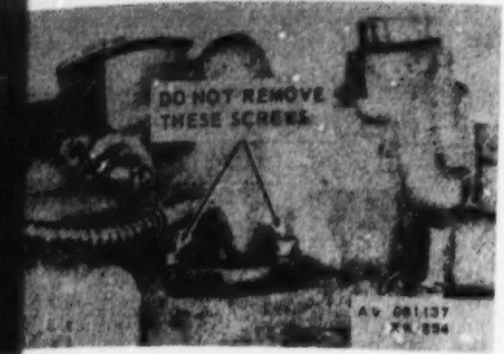


Figure 5-29A. Capillary Tube Positioned in Fuel Control

c. Disconnect starting fuel hose from starting fuel manifold. Connect drain hose to starting fuel hose and provide a container to catch fuel.

d. Disconnect main fuel hoses from main fuel manifolds. Attach drain hose to disconnected fuel hose and place end in container.

e. Open fuel shutoff valve.

f. Open oil shutoff valve.

g. For T53-L-7/7A engines, set fuel control switch on AUTOMATIC.

h. Place boost pump ON.

i. Position power lever in GROUND IDLE or higher.

j. Place condition lever OPEN.

CAUTION

prevent starter damage, do not ex-
d starter limitations.

ergize starter and starting fuel solenoid for
ately 30 seconds.

NOTE

peat preceding step k. until pure fuel
ws from drain hoses. Allow 30 seconds
tween each motoring.

low engine to coast down.

connect drain hoses and connect main and
fuel hoses to their proper connections.

ually inspect engine for leaks at next start.

JUSTMENT OF FUEL CONTROL (T53-L-
ines). Proceed as follows:

CAUTION

anizational maintenance personnel
y make three adjustments to the fuel
trol. Only adjust ground idle takeoff
reverse adjustments.

WARNING

pressure regulator valve and the max-
m fuel stop shall not be adjusted. All
stments of fuel control assembly may
t flight safety. Use extreme caution
accuracy in adjusting the fuel control.

NOTE

stments of fuel control are made
upon initial installation of a new or
ced fuel control, a new engine, or
a major component of the fuel sys-
has been repaired or replaced, or
gine speed is incorrectly set.

puting takeoff speed.

rom ENGINE DATA SHEET obtain guar-
producer (compressor rotor) takeoff speed
N1 for a standard day, 59 F.

Record local ambient temperature.

rom deviation in regulated gas producer
chart (figure 5-30), obtain takeoff speed
r for temperature recorded in preceding

(4) As the sign indicates, this change factor is to be added to, or subtracted from, the guaranteed gas producer rotor takeoff speed.

NOTE

The result in preceding step (4) is the gas producer rotor speed at which engine should operate with selector lever in TAKE-OFF position on this day.

b. Compressor rotor speed check.

(1) When compressor rotor speed is to be checked or adjusted and ambient temperature is below 48°F cold weather trimming procedures must be followed. (Refer to following steps d. and g.)

(2) Before adjusting fuel control, ensure that power lever on fuel control is hitting both stops and check freedom of travel as follows:

(a) Put masking tape over each stop.

(b) Start engine.

(c) Move power lever through full travel. Ensure that travel arc is from minus 2 to plus 2 degrees to 99 to 101 degrees. (Refer to paragraph 5-75.)

(d) Shut down engine and check masking tape for evidence of mark that indicates power lever is hitting stop.

(e) Remove masking tape from stops.

(3) Ensure that anti-icing system is off during all adjustment procedures.

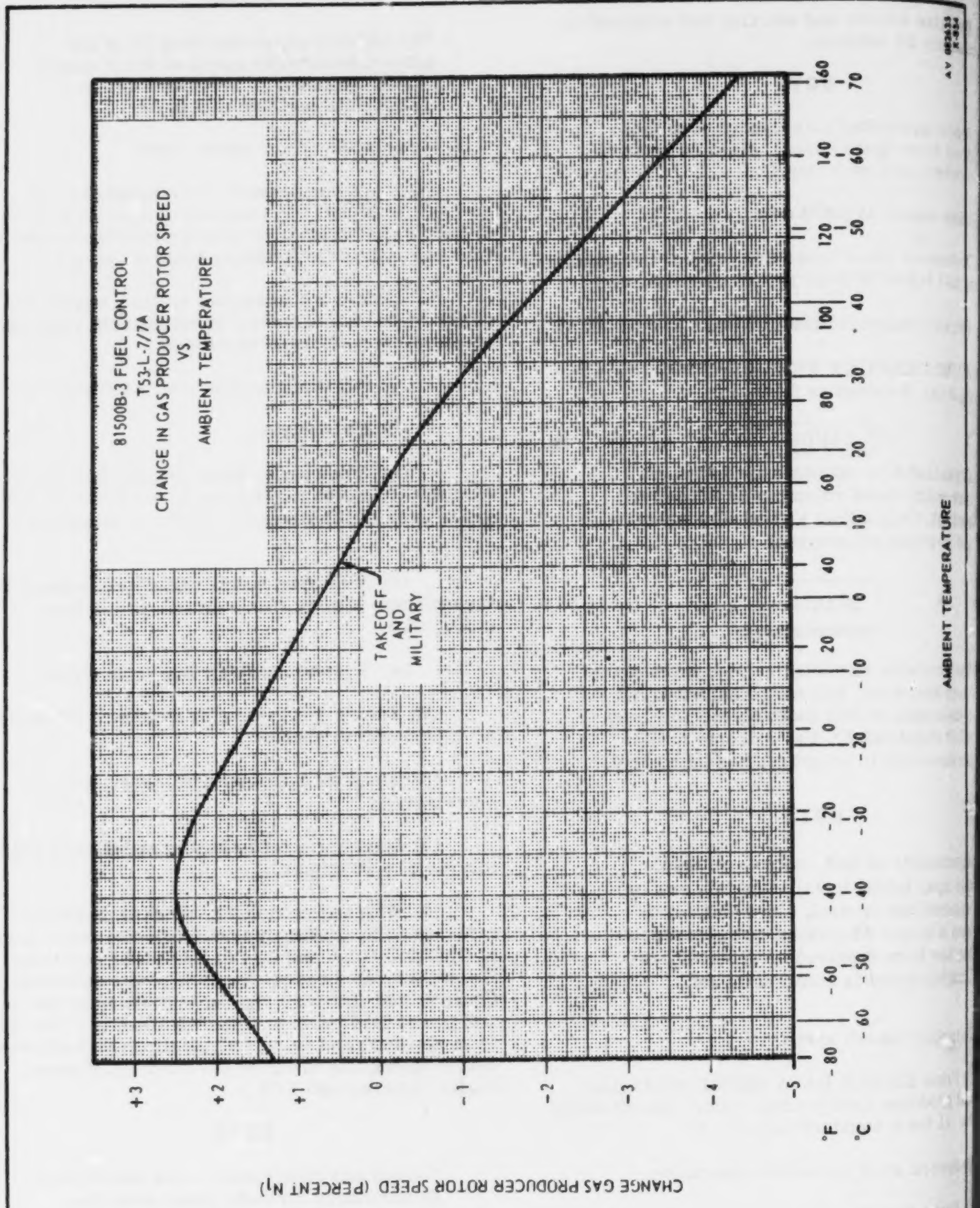
(4) Block off customer airbleed port at airbleed adapter.

(5) Start engine and allow to stabilize in flight idle for 5 to 10 minutes.

(6) With engine running, check compressor rotor speed by positioning main selector lever first in GROUND IDLE and then in TAKEOFF positions. Record indicated speeds for each power selection. Confirm that airframe rigging is positioning fuel control power lever arm at GROUND IDLE position (23 to 26 degrees) and not at "A" location (20.5 degrees) before attempting to adjust GROUND IDLE speed. (Refer to paragraph 5-75.)

NOTE

Torque and compressor rotor speed must be monitored for each power selection. Do not exceed computed takeoff speed (corrected for cold weather and airbleed conditions, if necessary). Do not exceed torque limit of 102 psi indicated.


81500B-3 FUEL CONTROL
T53-L-7/7A
CHANGE IN GAS PRODUCER ROTOR SPEED
VS
AMBIENT TEMPERATURE
TAKEOFF AND MILITARY
CHANGE GAS PRODUCER ROTOR SPEED (PERCENT N_1)
+3
+2
+1
0
−1
−2
−3
−4
−5
°F
°C
−80
−60
−40
−20
0
20
40
60
80
100
120
140
160
−60
−50
−40
−30
−20
−10
0
10
20
30
40
50
60
70
AMBIENT TEMPERATURE

(7) If it is determined that compressor rotor d will exceed corrected compressor rotor take- peed before power lever travels full arc, shut engine and adjust fuel control.

(8) If engine is operating above or below cor- d compressor rotor takeoff speed, shut down e and adjust fuel control.

(9) If engine is operating above or below com- sor rotor ground idle speed (40 to 44 percent), down engine and adjust fuel control.

Compressor rotor takeoff speed adjustment - ent temperature above 48 °F. (See figure .)

(1) Cut lockwire and loosen trimmer lock bolt.

NOTE

One complete turn of takeoff trimmer changes takeoff speed approximately 3.6 percent, and reverse speed approximately 1.2 percent in the same order (i.e., an increase in takeoff speed will produce an increase in reverse speed; a decrease in takeoff speed will produce a decrease in reverse speed).

(2) Increase takeoff rpm by turning takeoff er counterclockwise. Decrease by turning er clockwise.

(3) Recheck and adjust takeoff speed until cor- peed is attained.

NOTE

In following step (4) takeoff trim adjustment will have a small effect on ground idle speed and reverse speed. A small ground idle trim adjustment will have a large effect on reverse speed. Reverse speed must be checked after every trim adjustment.

4) When correct takeoff speed has been at- check and adjust ground idle and reverse , if necessary.

ompressor rotor takeoff speed adjust- ambient temperature at or below 48 °F. ure 5-31.) Proceed as follows:

CAUTION

n following step (1) when all weather rim control is being used to adjust fuel ontrol, do not attempt rapid accelera- ons or decelerations.

) Engage all weather trim control by turning trol as far counterclockwise as possible.

Subtract 5 percent from computed compressor rotor takeoff speed. The result is the speed to which the engine must be adjusted.

(2) Perform procedures (1) through (4) in preceding step c.

WARNING

In following step (3) do not attempt to fly aircraft with cold weather stop installed or with all weather trim engaged.

NOTE

In following step (3) takeoff trim adjustment will have a small effect on ground idle speed and reverse power speed. A small ground idle trim adjustment will have a large effect on reverse power speed. Reverse power speed must be checked after every adjustment.

(3) Immediately after adjusting, return all weather trim control to original position and lockwire control in disengaged position.

e. Compressor rotor ground idle speed adjustment.

NOTE

In following step (1) one complete turn of ground idle trimmer changes ground idle speed approximately 11 percent.

(1) Increase ground idle rpm by turning ground idle trimmer counterclockwise. Decrease by turning trimmer clockwise.

NOTE

In following step (2) ground idle trim adjustment will have a large effect on reverse power speed and a small effect on takeoff speed. Recheck reverse power speed after ground idle speed adjustment.

(2) Recheck and adjust ground idle speed until correct speed is attained.

(3) When compressor rotor takeoff and ground idle speeds have been adjusted, tighten trimmer lock bolt as required. (Refer to table 11-3, reference number 74.) Lockwire and proceed with check and adjustment of reverse power speed.

f. Compressor rotor reverse power speed adjustment - all ambient temperatures.

NOTE

Reverse power speed must be checked and adjusted, if necessary, after every takeoff and ground idle speed adjustment.

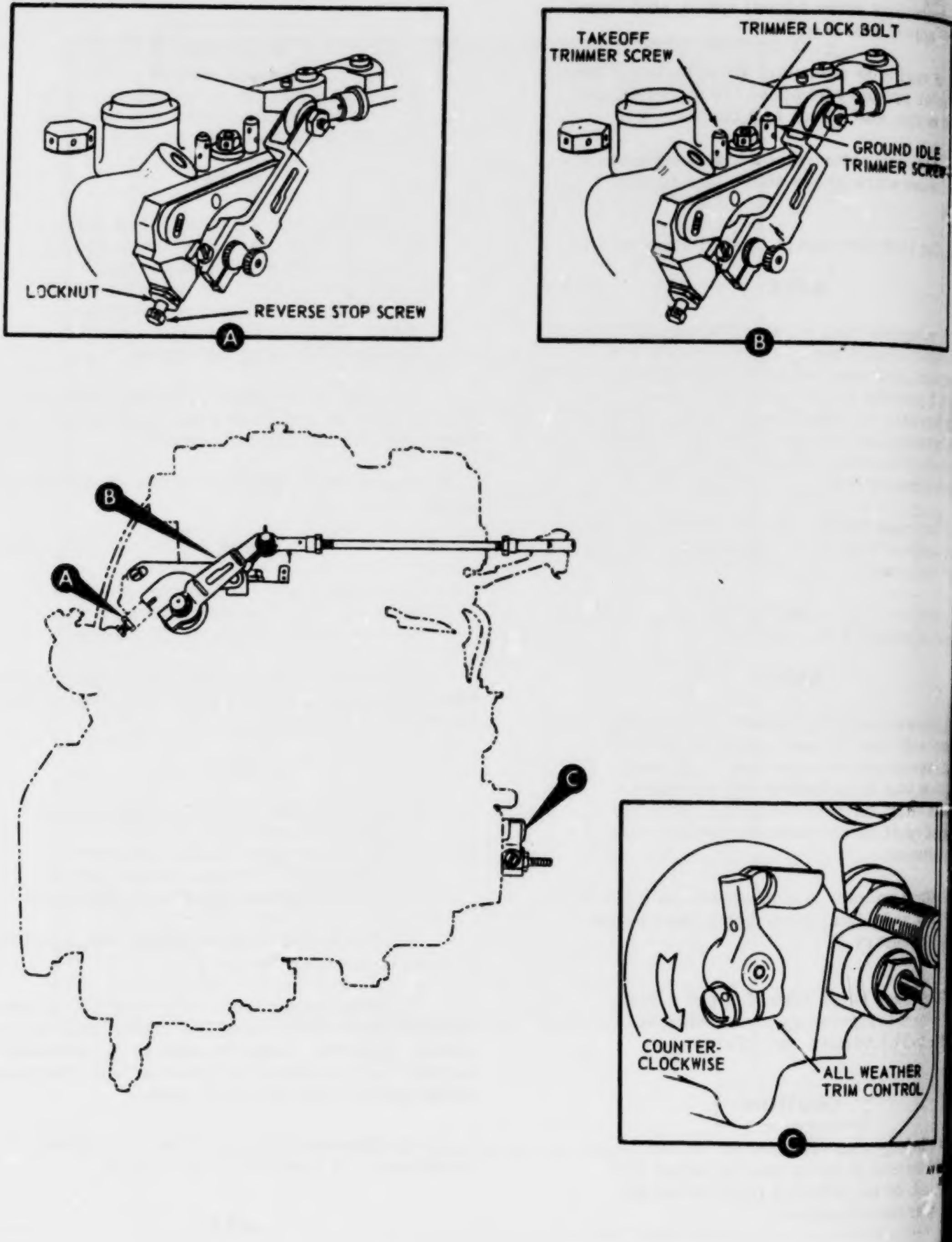

LOCKNUT
REVERSE STOP SCREW
A
TAKEOFF TRIMMER SCREW
TRIMMER LOCK BOLT
GROUND IDLE TRIMMER SCREW
B
B
A
C
COUNTER-CLOCKWISE
ALL WEATHER TRIM CONTROL
C

Figure 5-31. Fuel Control Adjustment (T53-L-7/7A)

(1) Full reverse power speed is equal to com- d compressor-rotor takeoff speed.

CAUTION

While engine is attaining reverse power speed, compressor rotor speed and engine torque must be monitored. Do not exceed computed compressor rotor takeoff speed. (Refer to preceding step a.) Do not exceed torque limit of 102 psi indicated.

NOTE

If reverse propeller speed for the T53-L7/7A engine is not within 1620 ± 20 RPM range, then adjust the fuel control reverse stop screw as required. Maintain ground idle speed range between 40 to 44 percent N_1.

(2) Start engine. Position power lever in RE- SE position, note and record compressor rotor d and propeller output shaft speed.

(3) Shut down engine, adjust reverse screw as required.

(4) (a) through (g) deleted.

(h) Lockwire lock nut on stop screw.

Acceleration check run.

(1) If, after completion of normal check run, suspected that engine acceleration time is not n limits, perform acceleration check. Accelera- time is time, in seconds, required for engine to lerate from corrected flight idle speed to cor- d takeoff speed (i.e., through 95 percent of r change from flight idle to takeoff speeds at ard day sea level conditions).

NOTE

Ambient temperature affects N1 speed and time required for acceleration. Figure 5-32 provides curves from which N1 speed correction factors may be determined to correct flight idle speed and to establish N1 speed at which 95 percent of the standard day sea level power change between flight idle and takeoff speeds is reached. Table 5-1 provides time correction factors, in seconds, which are to be added to standard day sea level acceleration time.

(2) Before performing an acceleration check, e that customer bleed air is blanked off and ngine is free from accessory loads (generator n off).

(3) Note ambient temperature and field ele- n.

(4) From engine data sheet, obtain guaranteed N1 takeoff speed for standard day sea level conditions.

(5) Using figure 5-32, obtain the N1 speed correction factor for the ambient temperature noted in preceding step (3). Subtract correction factor obtained from guaranteed N1 takeoff speed obtained in preceding step (4). Result is N1 speed, for given ambient temperature, at which engine will have reached 95 percent of standard day sea level power change from flight idle to takeoff.

(6) Using figure 5-32, obtain N1 flight idle speed correction factor for given ambient temperature. As graph indicates, add the correction factor to or subtract correction factor from standard day flight idle speed (65 percent). Result is corrected flight idle speed from which engine must accelerate.

NOTE

Standard day sea level acceleration time is 4 seconds, based on operation with no loading of accessory drives, minimum permissible customer bleed air flow, and no inlet duct losses.

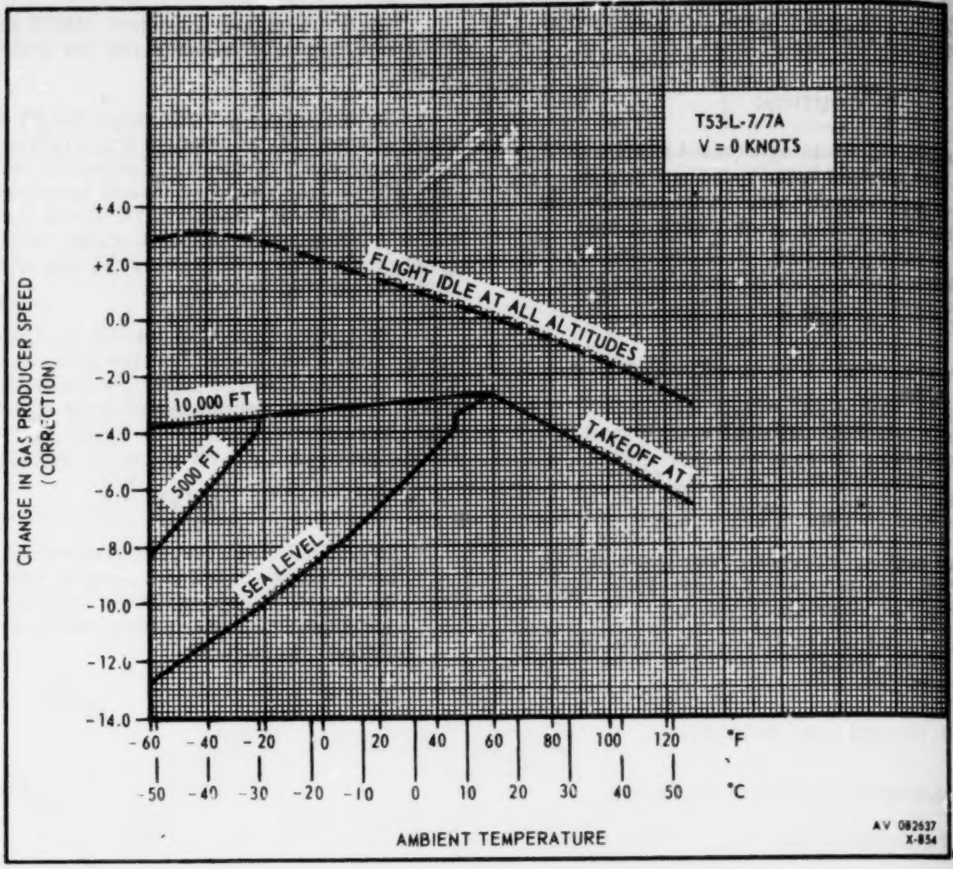


Figure 5-32. Correction Factors to Achieve 95 Percent of Power Change During Transient (T53-L-7/7A)

Table 5-1. Acceleration Time Correction Factors

TEMP (°F)	5000 FT	4000 FT	3000 FT	2000 FT	1000 FT	SEA LEVEL
50	0.4	0.3	0.2	0.1	0.0	0.0
60	0.5	0.4	0.3	0.2	0.1	0.0
70	0.7	0.6	0.5	0.4	0.3	0.2
80	0.9	0.8	0.7	0.6	0.5	0.4
90	1.1	1.0	0.9	0.8	0.7	0.5
100	1.2	1.1	1.0	0.9	0.8	0.7
NOTE: All time correction factors are given in seconds.						

(7) Using table 5-1, obtain acceleration time correction factor, in seconds, for given ambient temperature and field elevation (altitude). Add acceleration time correction factor to standard day sea level acceleration time for the engine. Result is time engine should take to reach N1 speed established in preceding step (5).

(8) Start engine and stabilize in flight N1 speed determined in preceding step (6).

(9) Using stop watch to time accelera vance power lever, in one second or less, fro position at corrected flight idle speed to TAK position and simultaneously start stop watch.

(10) Stop stop watch when engine speed N1 speed determined in preceding step (5). power lever to flight idle and allow engine sp stabilize at corrected flight idle speed.

(11) Note elapsed time on stop watch. time should be equal to or less than time est in preceding step (7).

(12) Repeat preceding steps (9) and (10) and use average of three readings as actual tion time.

(13) If acceleration time is within limit down engine.

(14) If acceleration time is not within limits nd if bleed band operation is normal, replace fuel ontrol and recheck acceleration.

-86. ADJUSTMENT OF FUEL CONTROL (T53-L-5/701 Engines). Adjustment of the fuel control is equired following initial engine installation, follow-g the replacement of the fuel control or any of the s producer or power turbine nozzles, or whenever gine performance is suspect. Following steps a., , and d. apply to T53-L-15 engines at all ambient mperatures and T53-L-701 engines at ambient mperatures up to 45°F. Step c. applies to both 53-L-15 and -701, regardless of the ambient tem-rature. Step f. applies only to T53-L-701 engines ambient temperatures of 45°F and above.

CAUTION

Organizational maintenance personnel may make only three adjustments to the fuel control: ground idle, military, and reverse power.

NOTE

If reverse propeller speed for the T53-L-15/701 engines is not within the 1620 ± 20 rpm range, then adjust the fuel control reverse stop screw. Maintain ground idle speed range between 48 to 52 percent N1.

a. Compute expected torque at military power.

(1) Record torque pressure (psi) at 3580 pound-t torque obtained from engine data plate.

(2) Record military power (M) Δ N1 percent ained from fuel control data plate.

(3) Record ambient air temperature and atmos-ric pressure.

NOTE

If temperature and Δ N1 percent variables do not permit use of figure 5-33, use figure 5-34.

(4) Enter curve from figure 5-33 or 5-34 at ient temperature to determine expected torque sure. (See sample calculation shown in figure .)

(5) Record expected torque pressure.

(6) Record propeller rpm from curve selected 0 or 1650).

. Check engine power and rpm.

(1) Ensure that airframe rigging is correct that power lever is hitting both stops.

(a) Apply tape (item 105, table 2-2) over stop.

(b) Start engine and move power lever gh full travel.

(c) Shut down engine and inspect tapes to y contact at both stops. Re-rig airframe controls quired and remove tape from stops.

(2) Disconnect variable inlet guide vane feedback rod from RUN position hole in IGV feedback lever and install in TEST position hole.

(3) Install stop (LTCT6763) on fuel control military power stop. (See figure 5-35.)

(4) Block off customer airbleed port at airbleed adapter.

(5) Visually inspect compressor for cleanliness. If compressor is dirty, clean as outlined in paragraph 7-15.

(6) Ensure that generator and engine anti-icing switches are off.

(7) Start engine and stabilize at flight idle.

(8) Retard power lever to ground idle and record N1 speed. Speed should be 48 to 52 percent N1 at 23 to 26 degrees throttle position.

(9) Slowly accelerate to maximum throttle position and propeller test rpm selected in step a. (6).

(10) Record indicated torque pressure (psi). Torque pressure must be within plus or minus 1.0 psi of expected pressure as recorded in step a. (5).

(11) Shut down engine.

NOTE

If it is determined that fuel control adjustment is required, perform steps c. and/or d. as applicable before proceeding to step e.

c. Adjust ground idle speed, if required, as follows:

(1) Cut lockwire and loosen trimmer lock bolt. (See figure 5-36.)

NOTE

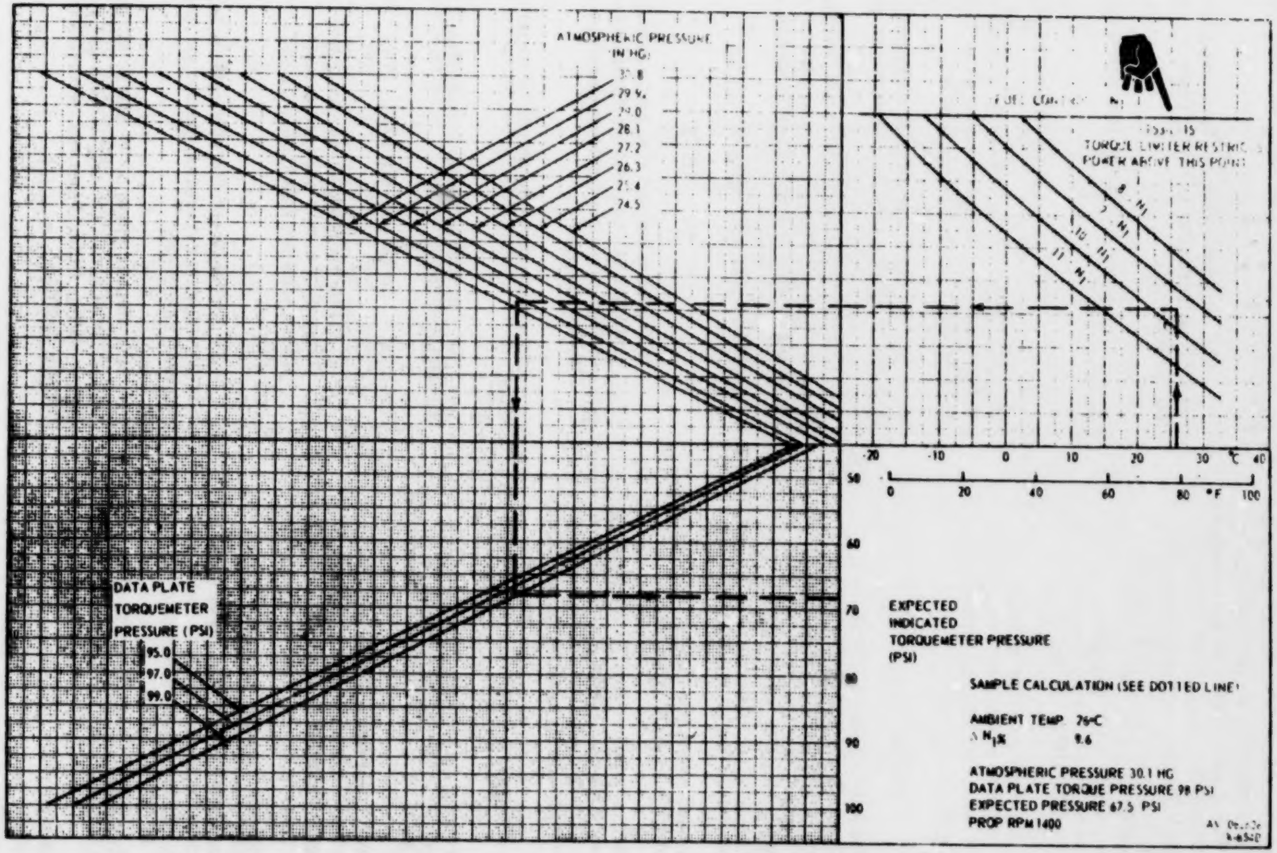
In following step (2) one complete turn of trimmer changes ground idle speed approximately 11 percent.

(2) Increase ground idle rpm by turning idle trimmer counterclockwise; decrease rpm by turning trimmer clockwise.

(3) Repeat steps b. (7) and b. (8) to check idle rpm. Repeat check and adjustment until ground idle rpm is within 48 to 52 percent N1 at 23 to 26 degrees throttle position.

d. Adjust military power torque, if required, as follows:

(1) Cut lockwire and loosen trimmer lock bolt.



SAMPLE CALCULATION (SEE DOTTED LINE)

AMBIENT TEMP 26°C
Δ N1% 9.6

ATMOSPHERIC PRESSURE 30.1 HG
DATA PLATE TORQUE PRESSURE 98 PSI
EXPECTED PRESSURE 67.5 PSI
PROP RPM 1400

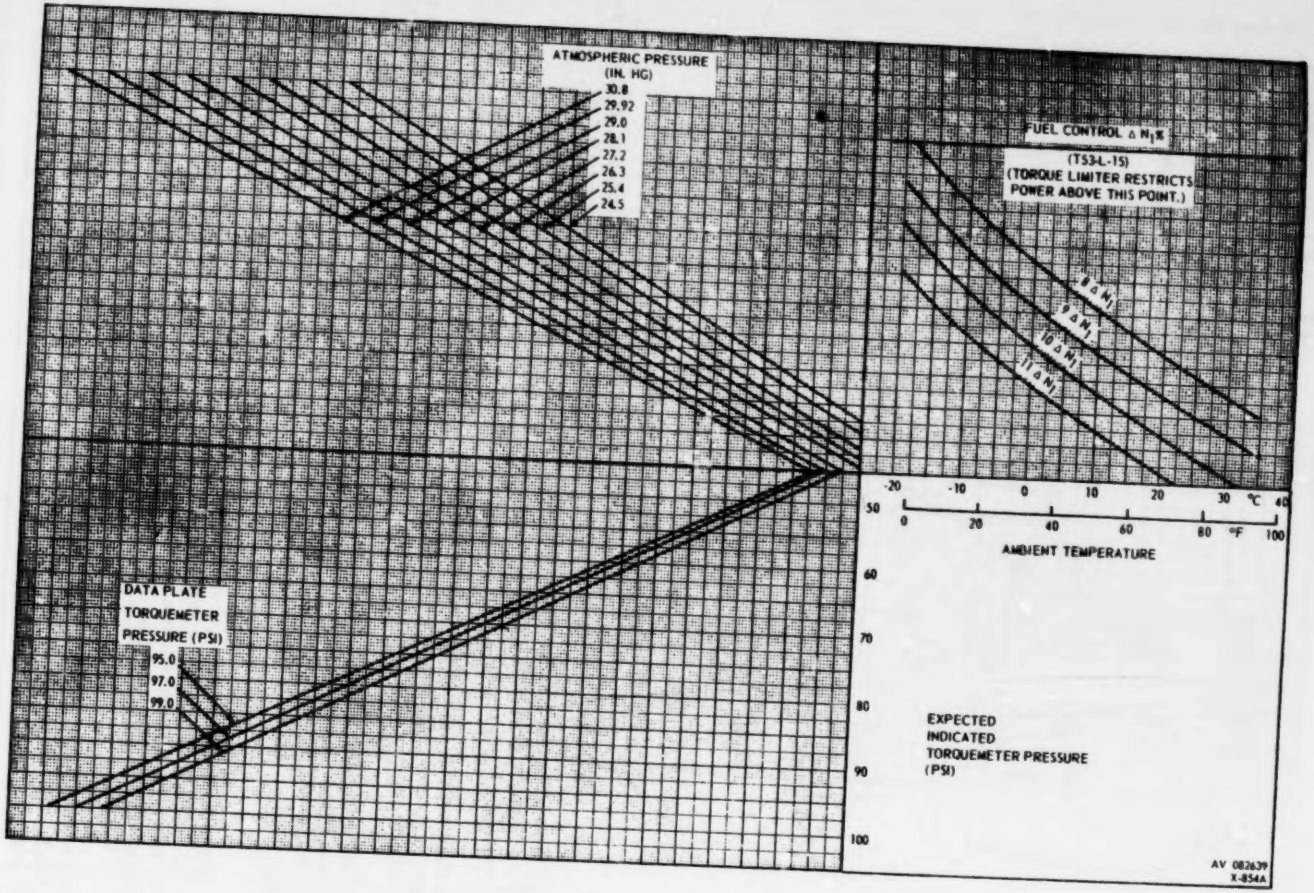


Figure 5-34. Military Power Adjustment at 1650 Propeller rpm.(T53-L-15) at All Ambient Temperatures and (T53-L-701) at Ambient Temperatures of 45°F or Below

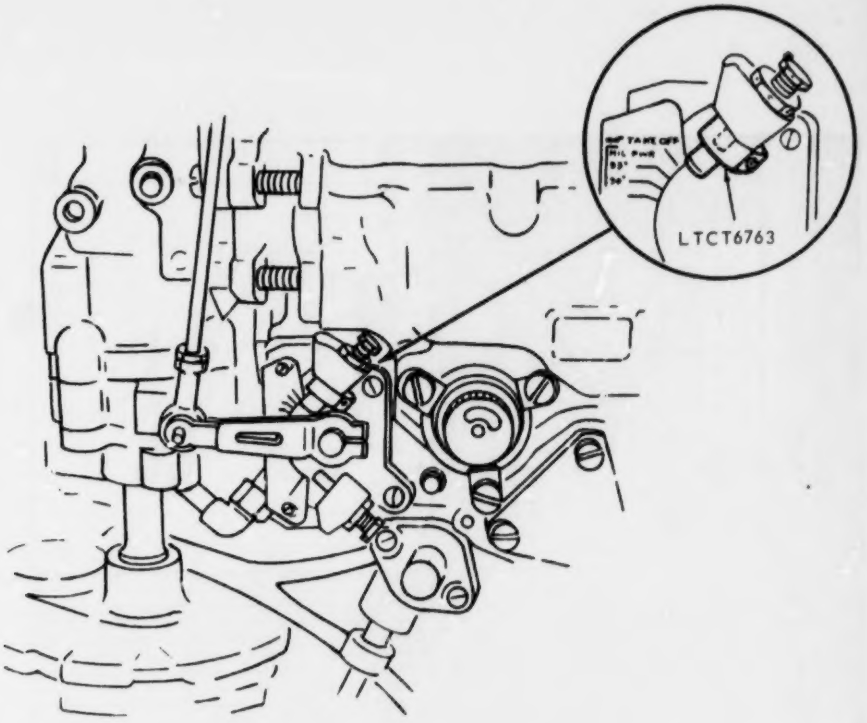


Figure 5-35. Stop Assembly (LTCT6763) Installed (T53-L-15/701)

NOTE

In following step (2) one-quarter turn of trimmer changes indicated torque by approximately 6 psi.

(2) Increase indicated torque pressure (psi) by turning military trimmer counterclockwise; decrease torque by turning trimmer clockwise.

(3) Repeat preceding steps b. (7), b. (9), and b. (10) to check military power indicated torque pressure. Repeat check and adjustment until indicated torque is within plus or minus 1.0 psi of expected torque.

e. After checks and adjustments are completed, tighten lock bolt to 26 to 30 pound-inches torque. Lockwire trimmer lock bolt and screws. If removed, reinstall feedback rod in RUN position. Remove stop assembly (LTCT6763).

f. For check and adjustment of military power torque for T53-L-701 engines at ambient temperature of 45°F or above, proceed as follows:

(1) Perform airframe rigging check. Refer to previous step b. (1).

(2) Enter curve from figure 5-36A at existing ambient temperature to determine expected torque pressure. (See sample calculation in figure 5-36A).

(3) Record expected torque pressure.

(4) Start engine and move power lever stop.

(5) Set propeller speed to 1675 and ensu tomer bleed and deicing valve are closed.

(6) Record indicated torque pressure (p Torque pressure must be within plus or minus of expected pressure as recorded in preceding

(7) If it is determined that fuel control ment is required, proceed as follows:

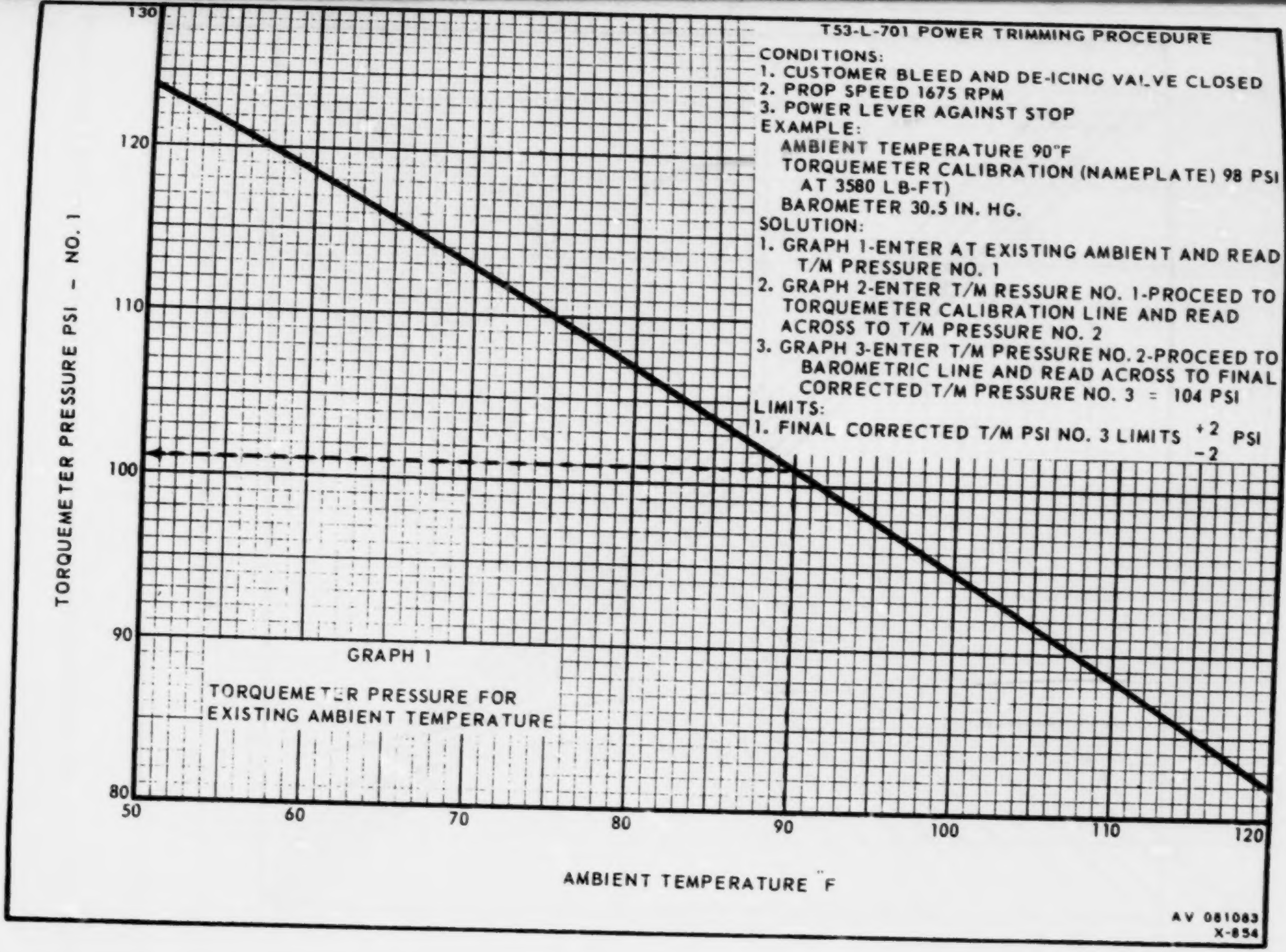
(a) Shut down engine.

(b) Cut lockwire and loosen trimmer bolt. (See figure 5-36.)

NOTE

In following step (c) one-quarter turn of trimmer changes indicated torque by approximately 6 psi.

(c) Increase indicated torque press by turning military trimmer counterclockwise crease torque by turning trimmer clockwise.



T53-L-701 POWER TRIMMING PROCEDURE

CONDITIONS:
1. CUSTOMER BLEED AND DE-ICING VALVE CLOSED
2. PROP SPEED 1675 RPM
3. POWER LEVER AGAINST STOP

EXAMPLE:
AMBIENT TEMPERATURE 90°F
TORQUEMETER CALIBRATION (NAMEPLATE) 98 PSI AT 3580 LB-FT)
BAROMETER 30.5 IN. HG.

SOLUTION:
1. GRAPH 1-ENTER AT EXISTING AMBIENT AND READ T/M PRESSURE NO. 1
2. GRAPH 2-ENTER T/M RESSURE NO. 1-PROCEED TO TORQUEMETER CALIBRATION LINE AND READ ACROSS TO T/M PRESSURE NO. 2
3. GRAPH 3-ENTER T/M PRESSURE NO. 2-PROCEED TO BAROMETRIC LINE AND READ ACROSS TO FINAL CORRECTED T/M PRESSURE NO. 3 = 104 PSI

LIMITS:
1. FINAL CORRECTED T/M PSI NO. 3 LIMITS $^{+2}_{-2}$ PSI

Figure 5-36A. Military Power Adjustment (T53-L-701) at Ambient Temperatures Above 45°F (Sheet 1 of 3)

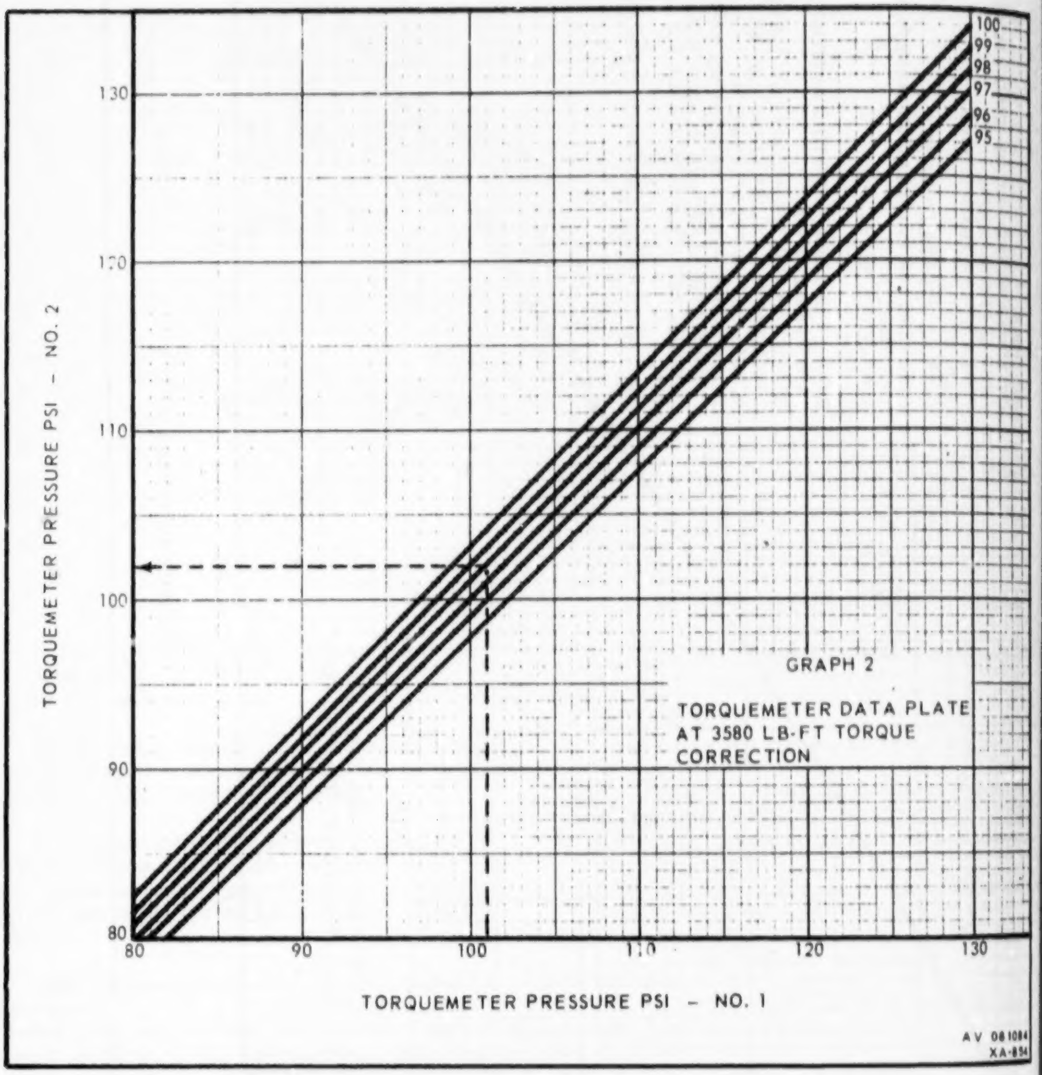


Figure 5-36A. Military Power Adjustment (T53-L-701) at Ambient Temperatures Above 45°F (Sheet 2 of 3)

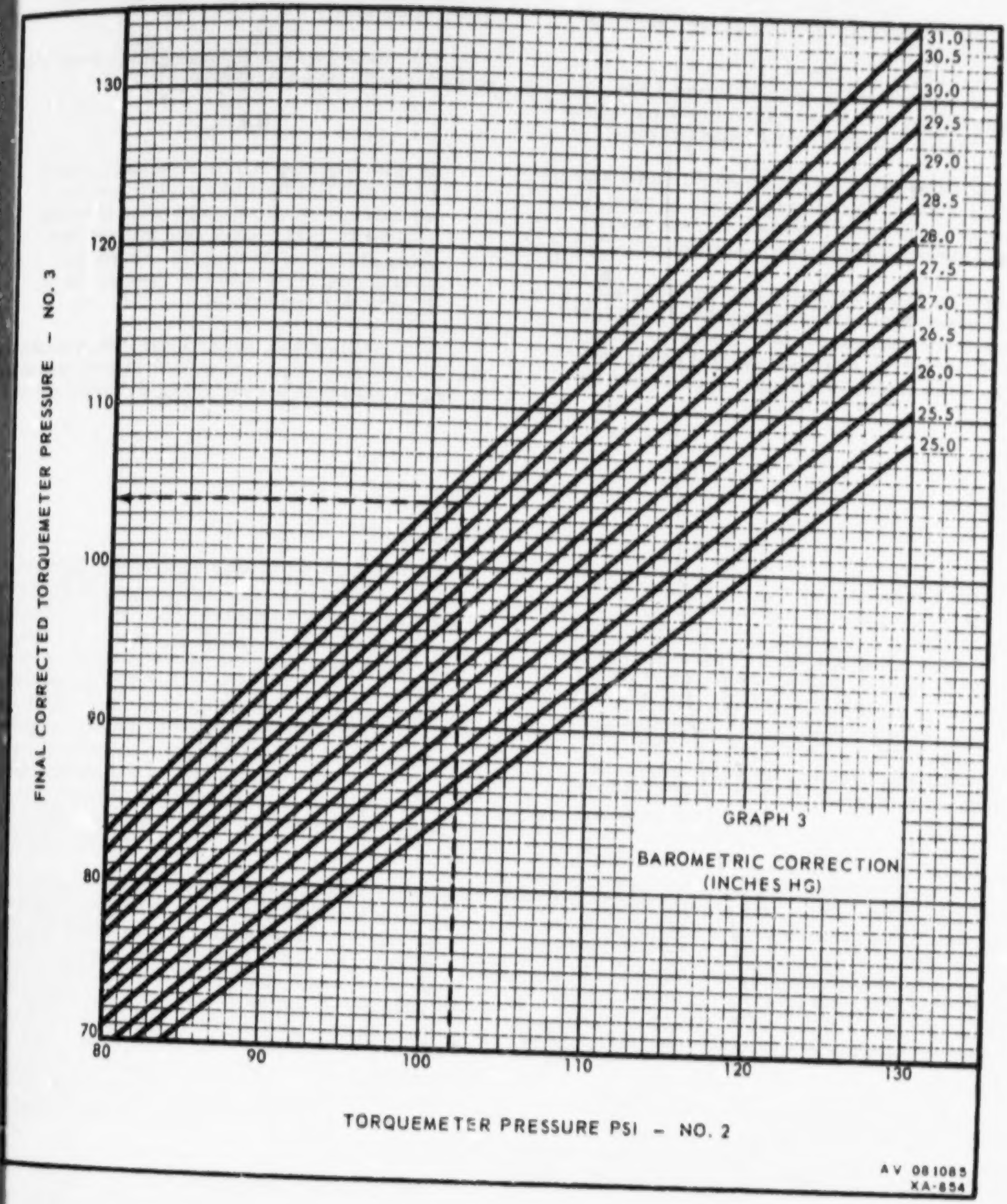


Figure 5-36A. Military Power Adjustment (T53-L-701) at Ambient Temperatures Above 45°F (Sheet 3 of 3)

(d) Repeat preceding steps (4), (5), and (6) to check military power indicated torque pressure. Repeat check and adjustment until indicated torque is within plus or minus 2.0 psi of expected torque.

(e) Recheck ground idle speed. Refer to preceding step c.

(f) After checks and adjustments are completed, tighten lock bolt to 26 to 30 pound-inches torque. Lockwire trimmer lock bolt and screws.

5-87. CHECKING, ADJUSTING, AND RIGGING FUEL CONTROL. Perform following procedures using special tool when position of fuel control main power lever plate requires adjustment. (See figure 5-37.)

a. Insert rigging pin through fuel control main power lever arm into hole in main power lever index plate, which corresponds to "A". Whenever proper location of "A" on the main fuel control power lever index plate is in doubt, following procedure can be used.

(1) Disconnect fuel control unit power rod sembly from fuel control arm.

(2) Remove airframe splined arm, P/N 134PM10016-1, from splined fuel control main power lever shaft.

(3) Place fuel control main power lever against takeoff mechanical stop.

NOTE

In following step (4) this resistance should occur within Flight Idle regime marked on index plate. Resistance noted is act of internal fuel control cam follower and is equivalent to 38 degrees. Repeat following step (4) in order to gain familiarity with this resistance.

(4) Slowly rotate power lever arm manual counterclockwise direction until first stiff resis to further motion is encountered. (See figure 5-

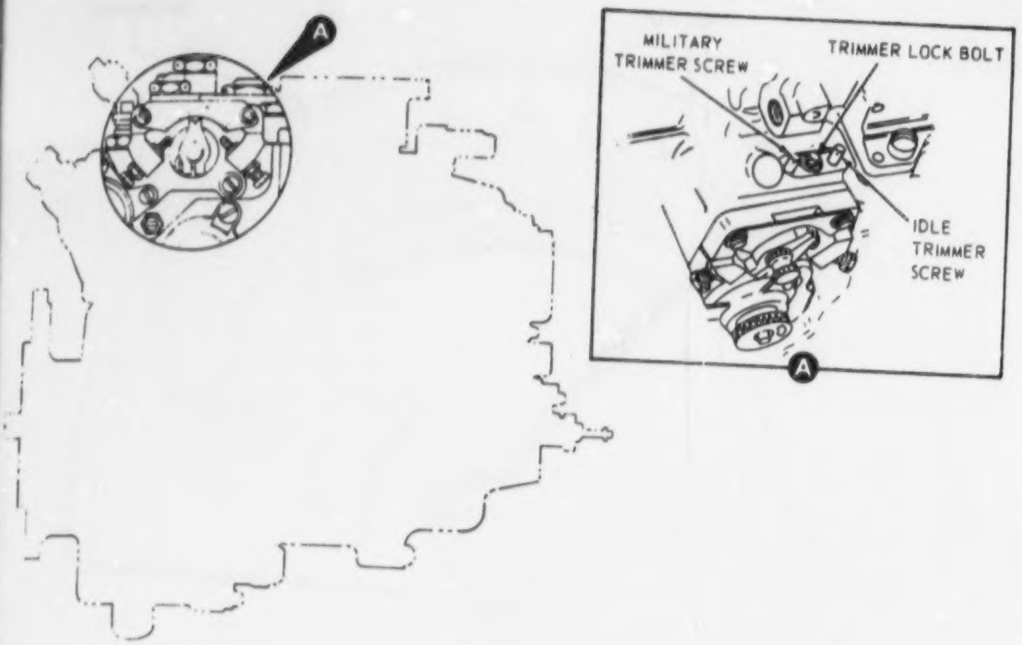


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Figure 5-36. Fuel Control Adjustments (T53-L-15/701)

(5) With power lever arm in this internal fuel ol fixed detent, position compass pointer on rig- ool (STD62489, FSCM 11599) to 38 degrees and ointer with wingnut (figure 5-38). Remove and screw in fuel control housing located just be- el control external reverse mechanical stop e 5-39). Place tool spline loosely around tool shaft. Without disturbing position of fuel con- ower lever, install compass on splined shaft of fuel control power lever arm. Just prior to engagement, position quadrant to align rec- ar slot of compass plate with threaded hole in ontrol housing.

(6) Place spacer in line with fuel control hous- readed hole, and position two one-inch diameter rs, AN960D416L, on head of spacer. (See fig- 40.) Engage quadrant with serrated fuel con- aft. (See figure 5-41.) Place another one-inch ter washer, AN960D416L, on top of compass d thread mounting screw through assembly. n screw to 25 pound-inches torque, to prevent s plate movement. (See figure 5-40.) Tighten line clamp, being careful not to disturb loca- fuel control power lever arm in its 38-degree n.

7) Release wingnut on quadrant pointer. Ro- l control lever arm to "A" position on fuel index plate.

NOTE

etter "A" is a reference rigging point. s primary function is to maintain a consistent rigging between fuel regulator and topping governor whenever they are interchanged. However, it is used as a starting point during process of initial airframe-to-fuel-control rigging. Letter "A" is not GROUND IDLE position and is equivalent to 20.5 angular degrees on fuel control power lever quadrant, which is apex of REVERSE power. GROUND IDLE is equal to 23 to 26 angular degrees on quadrant.

b. Insert a 0.157-inch diameter pin through slotted main fuel control power lever arm into "A" hole in fuel control index plate. Note indicated setting of quadrant pointer. It should indicate 20.25 to 20.75 degrees. If pointer does not indicate this value, loosen left countersunk screw, which retains index plate, but retain pin in "A" hole. Shift fuel control index plate until quadrant pointer indicates 20.25 to 20.75 degrees. Tighten countersunk screw and stake. (See figure 5-42.)

(1) Remove rigging tool (STD62489) from splined fuel control main power lever shaft, and replace screw previously removed from housing below reverse mechanical stop. Lockwire screw.

(2) Install airframe arm and connect push-rods.

(3) Whenever location of either external take-off and/or reverse stop is in doubt, the following procedure is to be accomplished, using preceding steps a. and b.

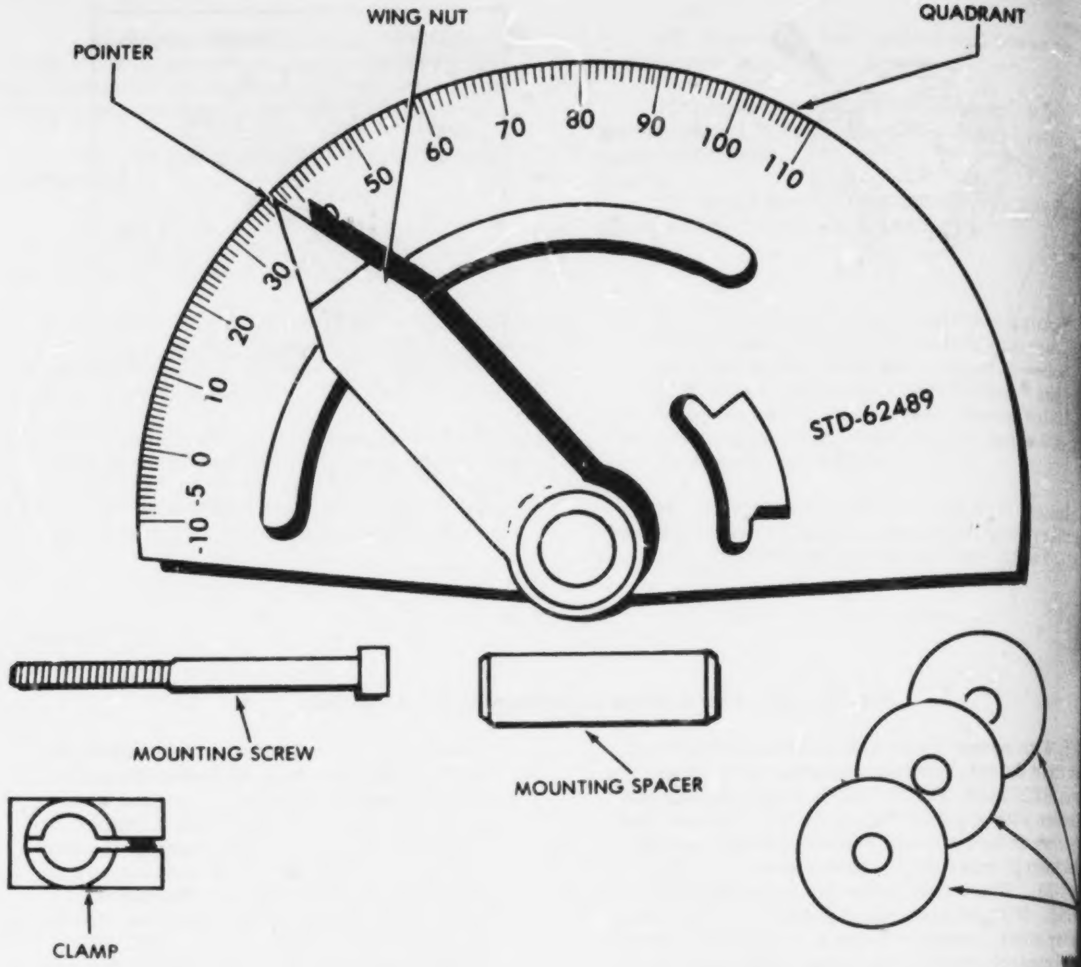


Figure 5-37. Positioning Quadrant Assembly

c. Rotate fuel control main power lever arm clockwise until take off mechanical stop is contacted. Note reading on quadrant pointer. Pointer should indicate 100 to 101 degrees. (Refer to fig. 5-43). Adjust stop if this valve is not observed on pointer. Rotate fuel control main power lever arm counterclockwise until reverse mechanical stop is contacted. Note reading on quadrant pointer. Pointer should indicate 0 plus or minus 2 degrees. (Refer to fig. 5-44). Adjust stop if this valve is not observed on quadrant pointer. Secure and lockwire jam nuts.

5-88. REMOVAL OF LUBRICATION PRESSURE MANIFOLD, OIL PRESSURE HOSES AND SCAVENGE HOSES (T53-L-7/7A Engines). (Refer to figures 5-45, 5-46, and 5-47.) Proceed as follows:

a. Drain oil from engine. (Refer to paragraph 3-37.)

b. Remove screws (3 and 4, figure 5-45) and nut (6) that secure clamps (2 and 5) to engine.

c. Disconnect hose assembly (1) from manifold (20) and from oil strainer housing (22) in exhaust Remove hose assembly.

d. Remove screws (21) and nuts (9) that secure lead and coil assembly clamps to oil manifold

NOTE

For access to bolt (10), remove three bolts 21, and 26, figure 5-76) spring (19), and (5, 18, 20, and 25) that secure airbleed to impeller housing. Pull actuator away compressor housing and remove bolt 5-45).

e. Remove bolts (7, 8, 10, and 15) that secure sembly (20) to impeller housing.

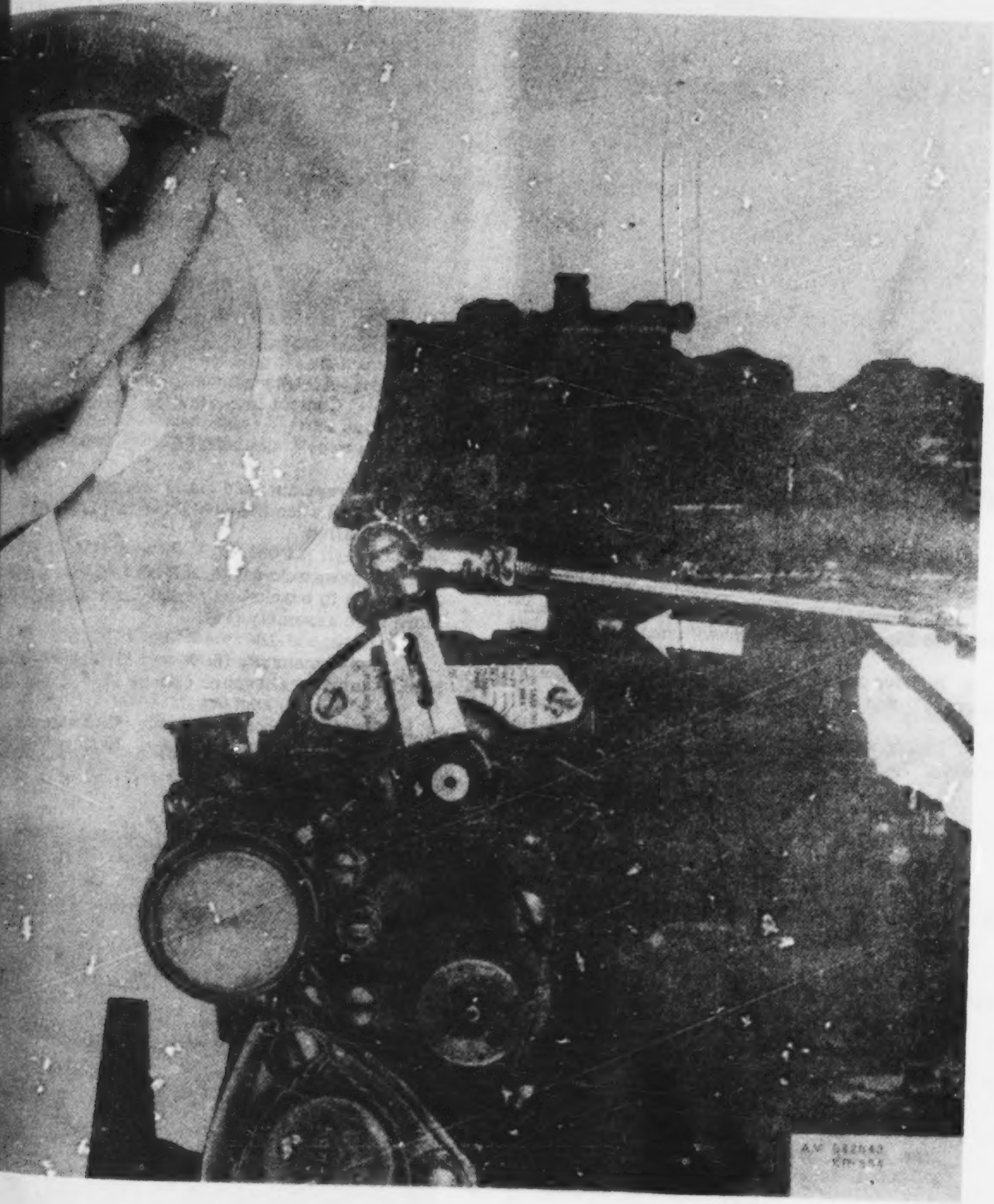


Figure 5-38. Positioning Power Lever Arm and Quadrant Assembly at 38 Degrees

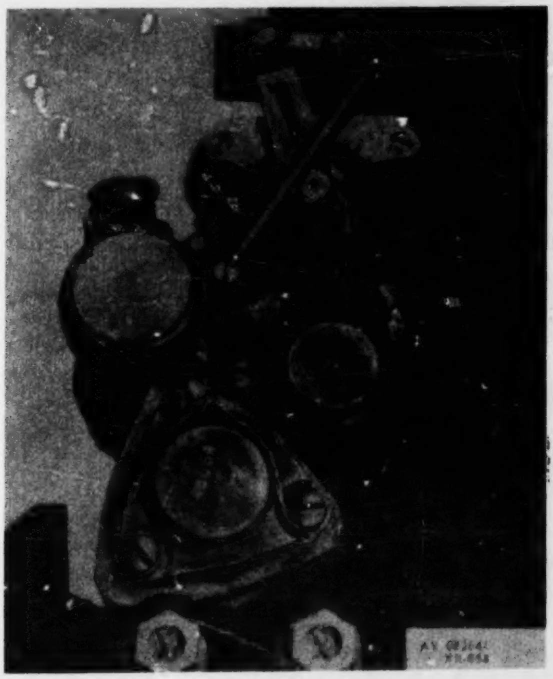


Figure 5-39. Removing Power Lever Retaining Plate Screw

f. Disconnect hose assemblies (11 and 18) from manifold assembly (20). Remove manifold assembly.

g. Remove screw (16) and nut (19) that secure clamp (17) and ignition lead clamp to bracket.

h. Disconnect hose assembly (18) from diffuser housing. Remove hose assembly.

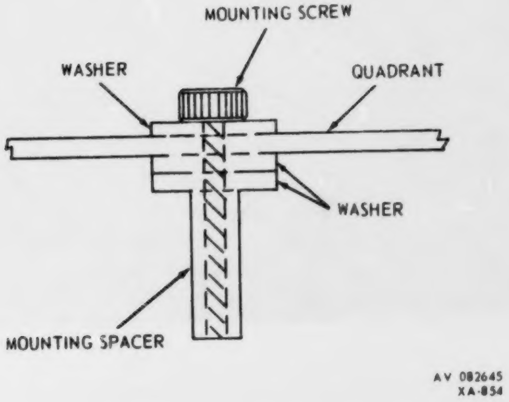


Figure 5-40. Installation of Quadrant Assembly

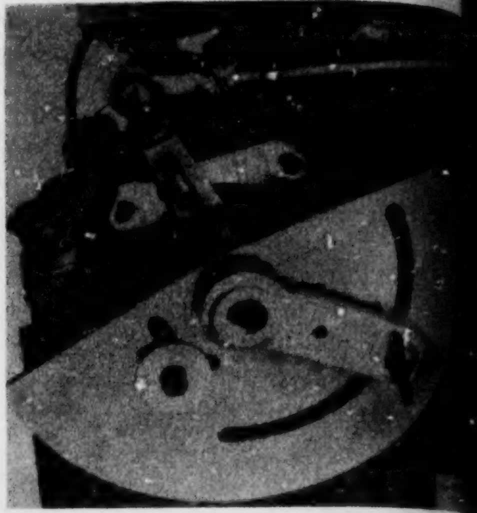


Figure 5-41. Quadrant Assembly Installed on Control Indicating 38 Degrees

NOTE

A screw, nut, and clamp are not required when hose (1-300-054-01) is installed.

i. Remove screw (12) and nut (14) that secur clamp (13) to bracket on compressor housing. R move hose assembly (11).

j. Remove screws (6, 9, and 11, figure 5-40) nuts (1 and 7) that secure clamps (3, 5, 8, and 1

k. Disconnect hose assembly (4) at accessory gearbox and at exhaust diffuser. Remove hose bly.

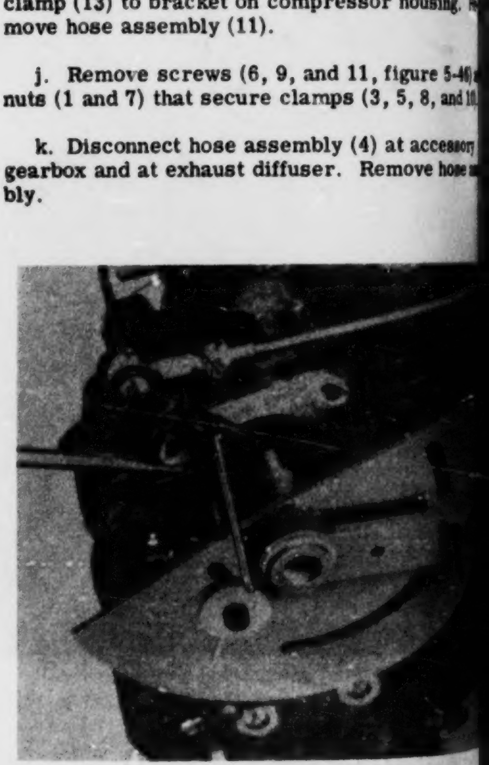
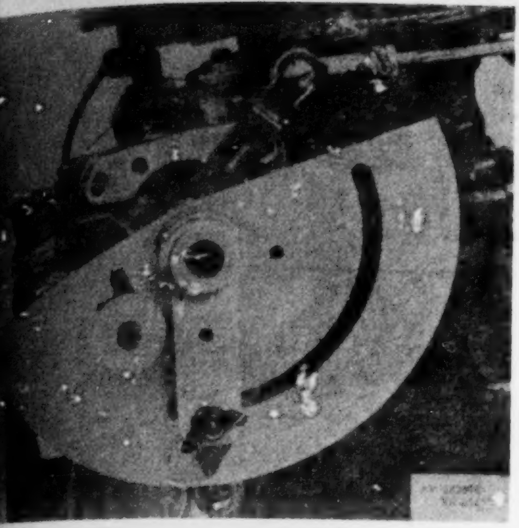


Figure 5-42. Shifting Main Power Lever Pl



gure 5-43. Proper Relationship of Quadrant Pointer and Fuel Control Arm at Takeoff Position

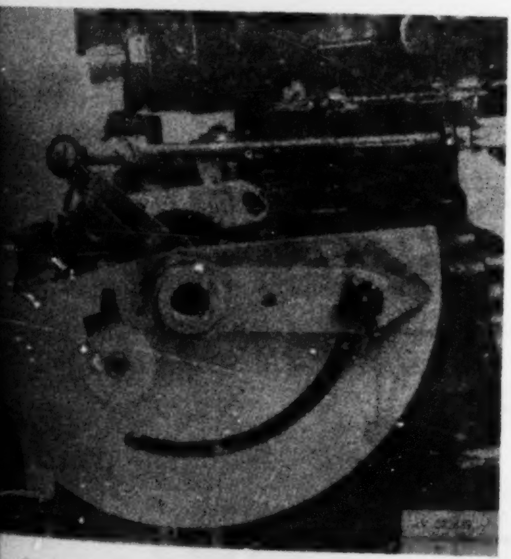
l. Disconnect hose assembly (2) from accessory rbox and from diffuser housing. Remove hose sembly.

m. Remove oil-in hose as follows:

(1) Remove screws (2, 5, and 12, figure 5-47) d nuts (4, 6, and 14) that secure clamps (3, 11, and to brackets.

(2) Disconnect fuel heater oil-in hose (1) from l heater and from elbow (8). Remove hose.

(3) Remove bolt (10), gaskets (7 and 9), and



re 5-44. Proper Relationship of Quadrant Pointer and Fuel Control Arm at Reverse Position

5-89. INSTALLATION OF LUBRICATION PRESSURE MANIFOLD, PRESSURE HOSES, AND SCAVENGE HOSES (T53-L-7/7A Engines). (See figures 5-45, 5-46, and 5-47.) Proceed as follows:

a. Position manifold assembly (20, figure 5-45) on right side of engine over impeller housing flange.

b. Secure brackets to impeller housing with bolts (7, 8, 10, and 15). Lockwire bolts.

c. Resecure airbleed actuator to impeller housing by installing spring (19, figure 5-76), washers (5, 18, 20, and 25), and three bolts (6, 21, and 26).

d. Connect aft fitting of hose assemblies (11 and 18, figure 5-45) to lower fittings of manifold assembly (20).

e. Clamp hose assembly (11) to bracket on compressor flange with clamp (13), screw (12), and nut (14).

f. (Deleted)

g. (Deleted)

h. Connect forward connector of oil hose assembly (1), finger-tight only, to oil manifold assembly and connect aft connector to oil strainer housing (22), finger-tight only.

i. Install clamps (2 and 5) and secure oil hose to the combustor-diffuser flange and combustion chamber housing with screws (3 and 4) and nut (6). Lockwire screw.

j. Hold oil strainer housing nut and tighten connector nut to 50 to 75 pound-inches torque.

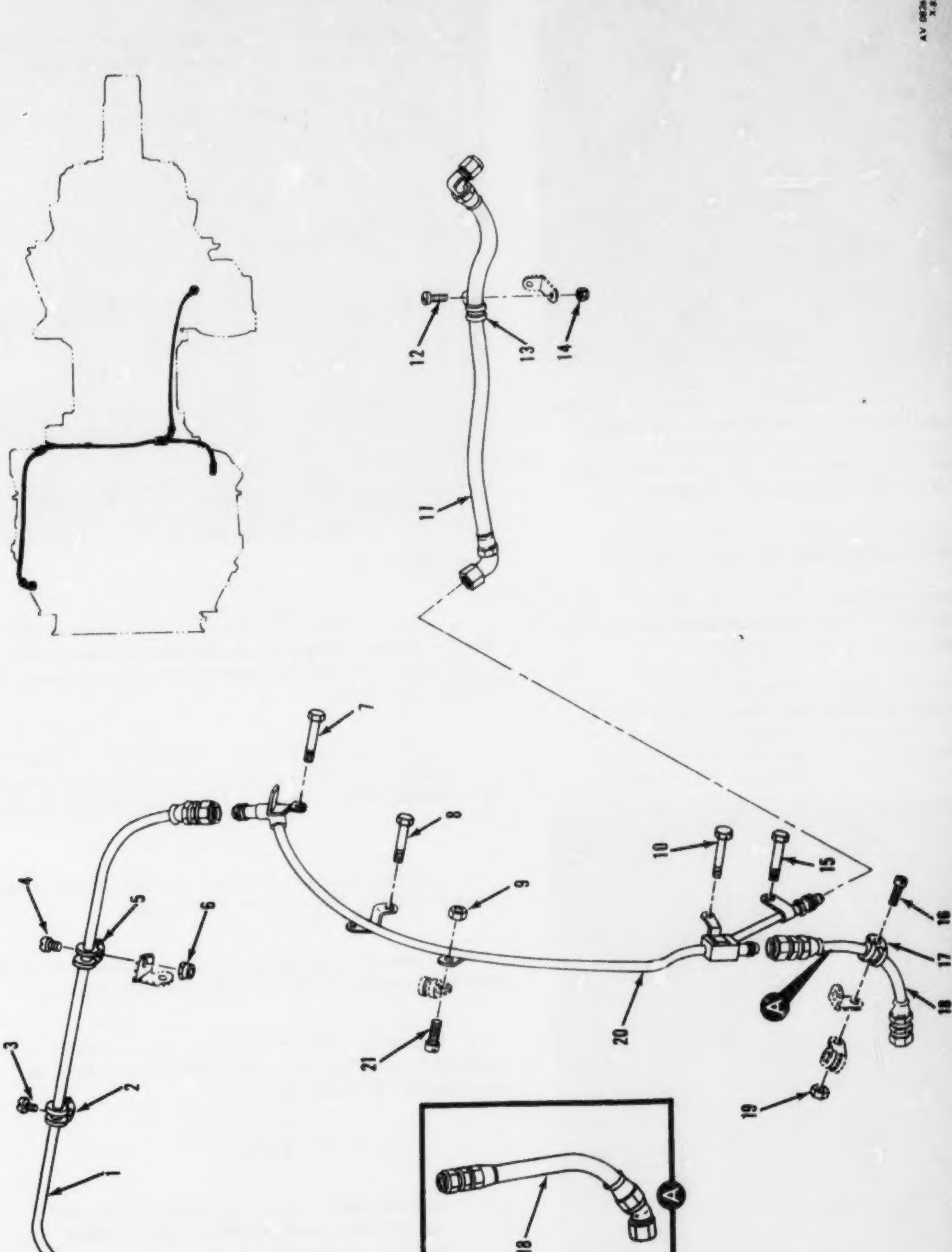
k. Connect hose assembly (18) to connector on oil manifold and to fitting in lower diffuser housing.

l. Resecure ignition lead and coil assembly to oil manifold assembly (20) with three sets of clamps, screws (21) and nuts (9).

NOTE

In following step m. a clamp, screw, and nut are not required when hose 1-300-054-01 is installed.

m. Secure hose assembly (18) and ignition lead and coil assembly to engine bracket with clamp (17), screw (16), and nut (19).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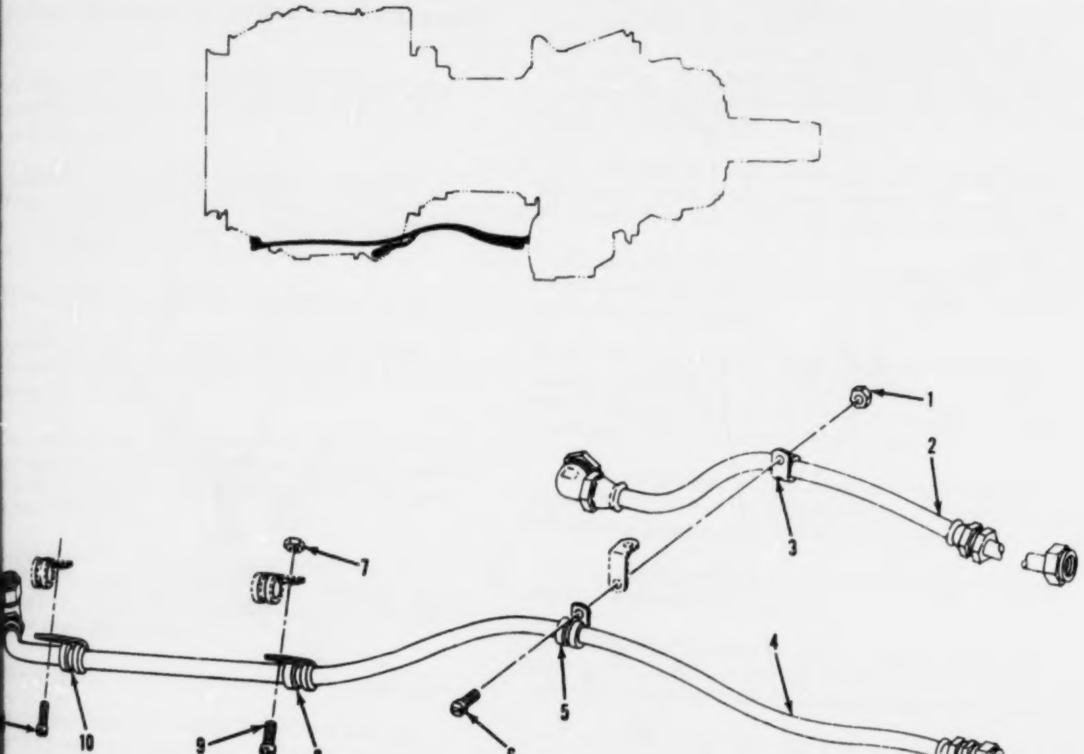
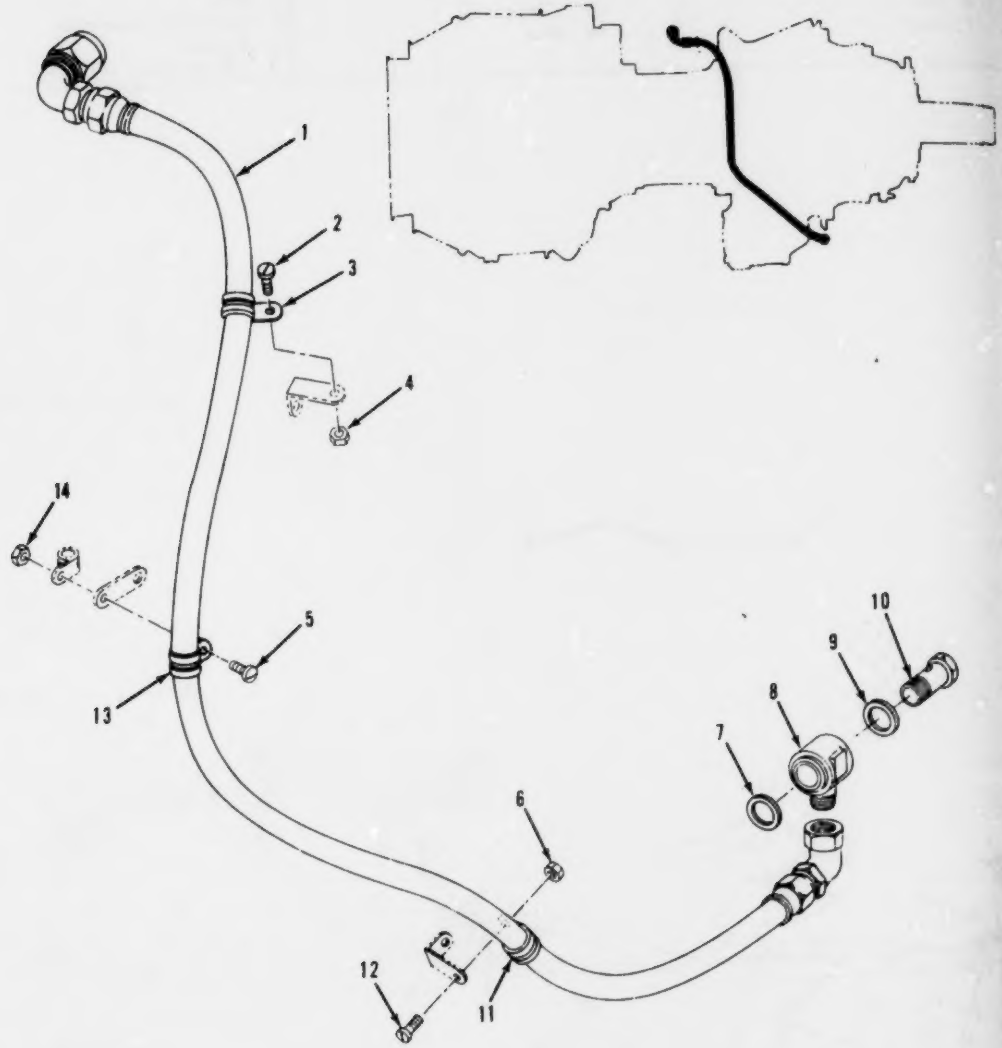
Key to Figure 5-45.

1. **Hose Assembly**
2. **Clamp**
3. **Screw**
4. **Screw**
5. **Clamp**
6. **Nut**
7. **Bolt**
8. **Bolt**
9. **Nut (Typical)**
10. **Bolt**
11. **Hose Assembly**
12. **Screw**
13. **Clamp**
14. **Nut**
15. Bolt
16. Screw
17. Clamp
18. Hose Assembly
19. Nut
20. Manifold Assembly
21. Screw
22. Oil Strainer Housing



1. **Nut**
2. **Hose Assembly**
3. **Clamp**
4. **Hose Assembly**
5. **Clamp**
6. **Screw**
7. **Nut**
8. **Clamp**
9. **Screw**
10. **Clamp**
11. **Screw**

Figure 5-46. Scavenge Oil Hoses and Attaching Parts (T53-L-7/7A)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6
12
11

1. Fuel Heater Oil-In Hose
2. Screw
3. Clamp
4. Nut
5. Screw
6. Nut
7. Gasket
8. Elbow
9. Gasket
10. Bolt
11. Clamp
12. Screw
13. Clamp
14. Nut

Figure 5-47. Fuel Heater Oil-In Hose and Attaching Parts (T53-L-7/7A)

Connect hose assembly (2, figure 5-46) to union cessory drive gearbox and to connector in bot- of diffuser housing.

Connect hose assembly (4) to union in acces- drive gearbox and to connector at fire shield.

Secure aft end of hose assembly (4) to engine clamps (8 and 10), screws (9 and 11), and nut

Secure hose assemblies (2 and 4) to engine et with clamps (5 and 3), screw (6), and nut (1).

Connect fuel heater oil-in hose (1, figure 5-47) l heater.

Install elbow (8) and gaskets (7 and 9) to oil Secure with bolt (10).

Connect fuel heater oil-in hose (1) to universal

Secure fuel heater oil-in hose (1) to brackets lamps (3, 13, and 11), screws (2, 5, and 12), ts (4, 14, and 6).

REMOVAL OF LUBRICATION PRESSURE OLD, PRESSURE HOSES, AND SCAVENGE (T53-L-15/701 Engines). (See figures 5-48 49.) Proceed as follows:

Drain engine oil. (Refer to paragraph 3-37.)

Remove screws (2 and 4, figure 5-48, sheet 1) lamps (3 and 5). Remove screw (6) and nut (8) lamp (7).

Disconnect hose assembly (1) from oil strainer adapter on top of combustion chamber assem- from lubrication pressure manifold (19) and hose assembly.

Disconnect hose assembly (18) from No. 2 oil-pressure fitting on diffuser housing as- and from lubrication pressure manifold (19) ove hose assembly.

emove screw (15) and nut (9) from clamp (10).

sconnect hose assembly (11) from adapter lubrication pressure manifold (19) and re- se assembly.

emove connector (14), packings (13), and (12) from inlet housing.

NOTE

cause of the inaccessibility of bolts (16 d 17), the interstage bleed actuator as- mbly will have to be removed before lubrication pressure manifold (19) can removed. (Refer to paragraph 5-158.)

h. Remove bolts (16 and 17, figure 5-48, sheet 1) that secure lubrication pressure manifold (19) to engine and remove manifold.

i. Remove screws (23, 30, and 34, figure 5-48, sheet 2), nuts (26, 27, and 31) that secure clamps (24, 29, and 32) to brackets (25, 28, and 33).

j. Disconnect hose assembly (20) from elbow (21) on the oil heat exchanger and on the fuel heater assembly. Remove hose assembly.

k. Disconnect hose assembly (20) from elbow (22) on inlet housing.

l. Remove screw (15, figure 5-49) from clamp (14). Remove nut (2) and screw (10) from clamps (1 and 9).

m. Disconnect hose assembly (8) from connector (16) at bottom of combustor turbine assembly and from union (7) on accessory drive gearbox assembly and remove hose assembly. Remove connector (16) and packing (17) from combustor turbine assembly. Remove packing from connector.

n. Disconnect hose assembly (3) from diffuser housing assembly and from union (4) on accessory drive gearbox assembly and remove hose assembly.

o. Remove unions (4 and 7) and gaskets (5 and 6) from accessory drive gearbox assembly. Remove gaskets from unions.

5-91. INSTALLATION OF LUBRICATION PRESSURE MANIFOLD, PRESSURE HOSES, AND SCAVENGE HOSES (T53-L-15/701 Engines). (See figures 5-48 and 5-49.) Proceed as follows:

a. Position lubrication pressure manifold (19, figure 5-48, sheet 1) on rear flange of impeller housing assembly and secure with bolts (16 and 17)

b. Reinstall interstage bleed actuator assembly. (Refer to paragraph 5-159.)

c. Position gaskets (5 and 6, figure 5-49) onto unions (4 and 7) and install unions into accessory drive gearbox assembly. Tighten unions as required.

d. Connect hose assembly (3) to connector at bottom of diffuser housing assembly and to union (4) on accessory drive gearbox. Tighten hose connectors as required. (Refer to table 11-3, reference number 106.)

e. Position packings (17) onto connector (16) and install connector into bottom of combustor turbine assembly. Tighten connector to standard torque and lockwire.

f. Connect hose assembly (8) to connector (16) and to union (7) on accessory drive gearbox. Tighten hose connectors as required. (Refer to table 11-3, reference number 109.)

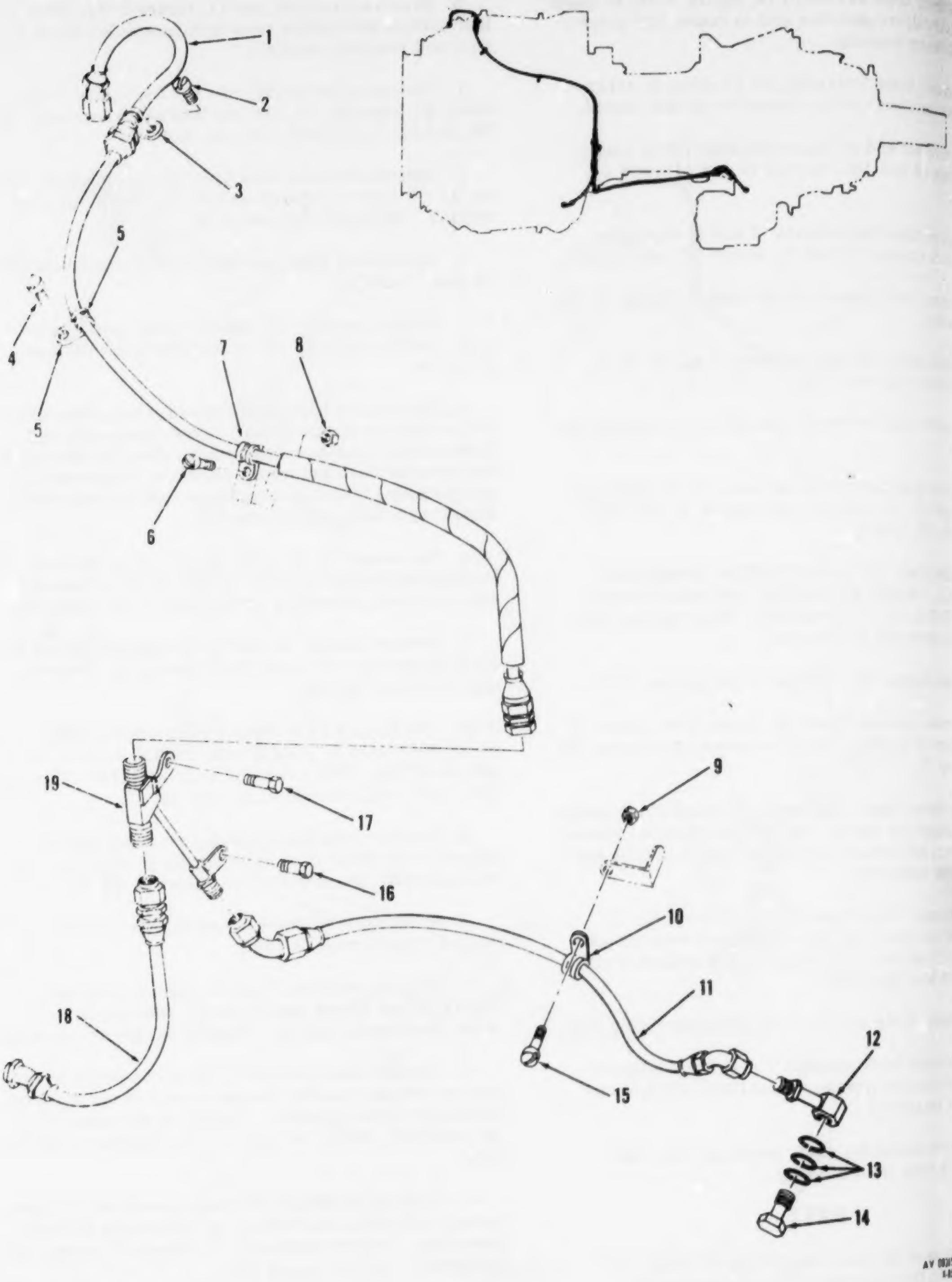
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Figure 5-48. Oil Pressure Hose Assemblies and Lubrication Manifold and Attaching Parts (T53-L-15/701) (Sheet 1 of 2)

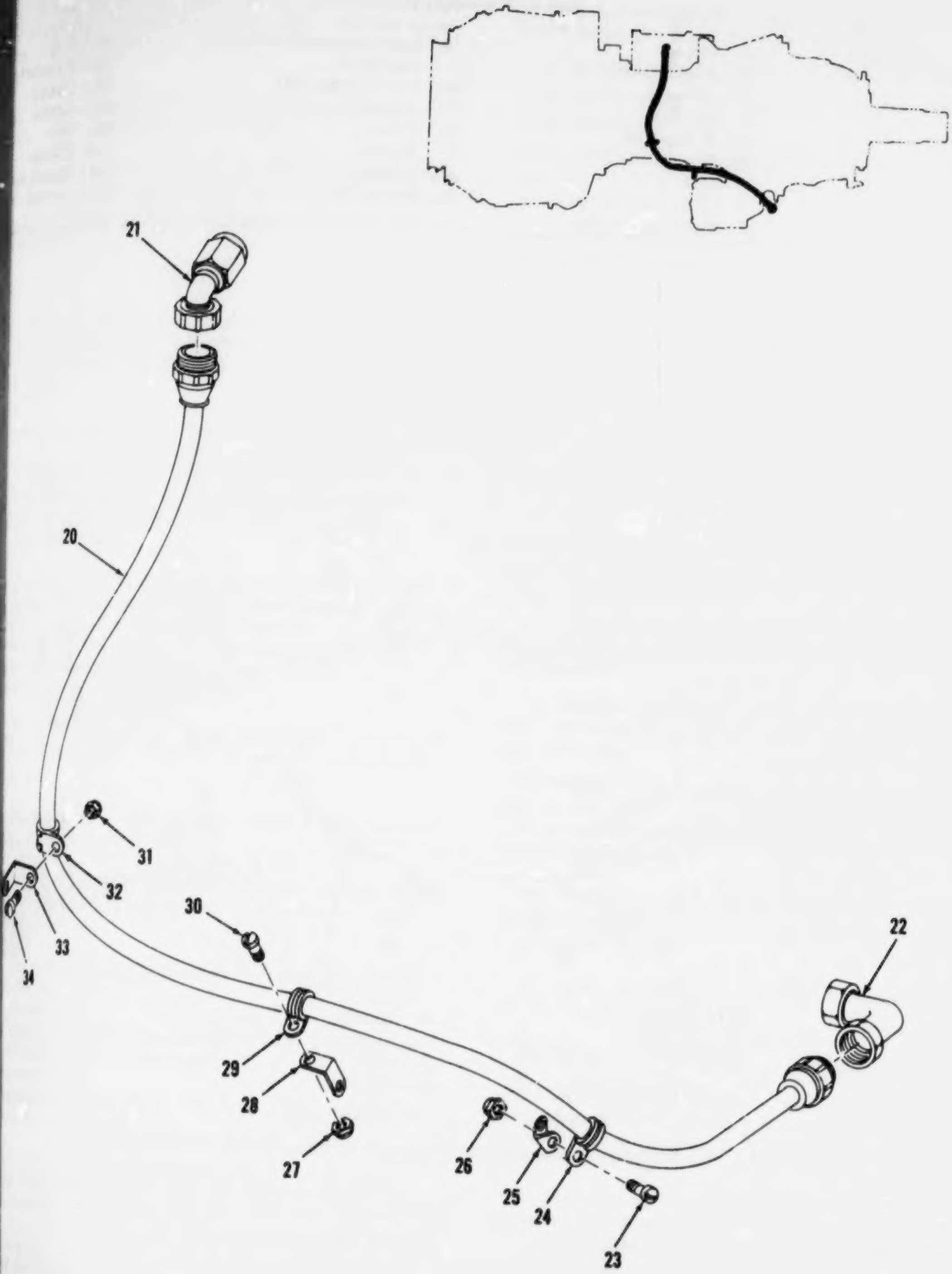
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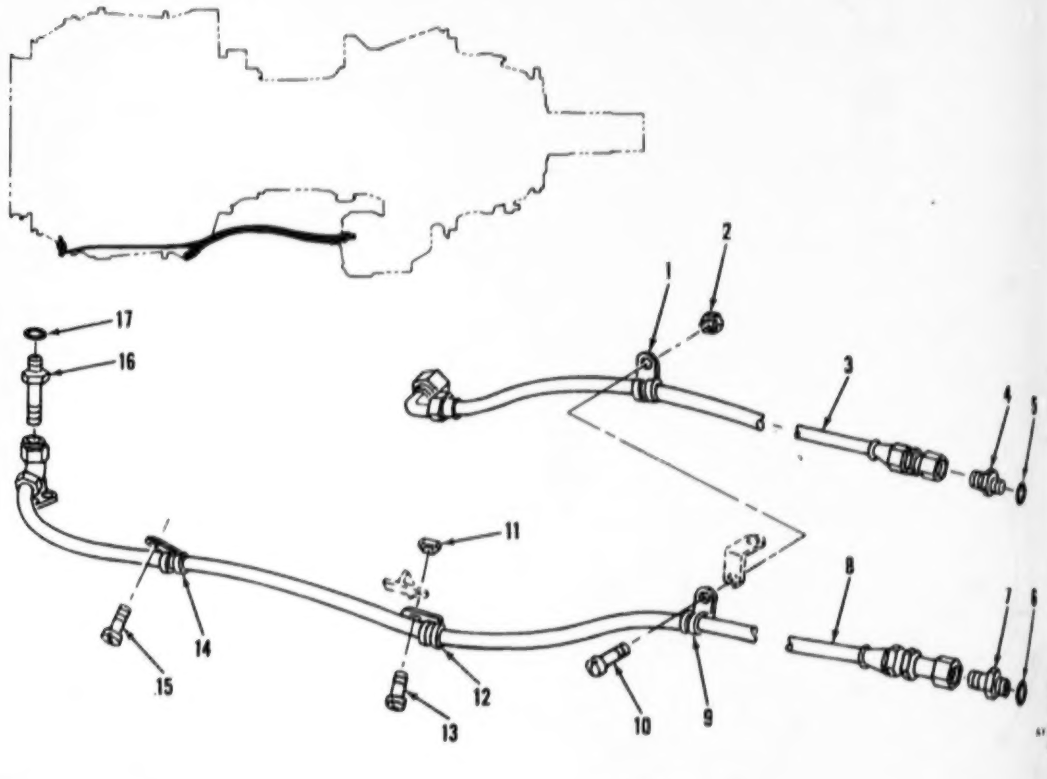
Figure 5-48. Oil Pressure Hose Assemblies and Lubrication Manifold and Attaching Parts (T53-L-15/701) (Sheet 2 of 2)

Key to Figure 5-48.

1. Hose Assembly
2. Screw
3. Clamp
4. Screw
5. Clamp
6. Screw
7. Clamp
8. Nut
9. Nut
10. Clamp
11. Hose Assembly
12. Adapter
13. Packing
14. Connector
15. Screw
16. Bolt
17. Bolt
18. Hose Assembly
19. Lubrication Pressure Manifold
20. Hose Assembly
21. Elbow
22. Elbow
23. Screw
24. Clamp
25. Bracket
26. Nut
27. Nut
28. Brack
29. Clamp
30. Screw
31. Nut
32. Clamp
33. Brack
34. Screw



1. Clamp
2. Nut
3. Hose Assembly
4. Union
5. Gasket
6. Gasket
7. Union
8. Hose Assembly
9. Clamp
10. Screw
11. Nut
12. Clamp
13. Screw
14. Clamp
15. Screw
16. Conn
17. Pack

Figure 5-49. Oil Scavenge Hose Assemblies and Attaching Parts (T53-L-15/701)

g. Position clamps (1 and 9), one on each side of bracket located at bottom of interstage bleed actuator assembly, and secure with screw (10) and nut (2).

h. Secure clamp (12) to bracket on forward flange on combustion chamber housing with screw (13) and nut (11). Secure clamp with screw (15).

i. Connect hose assembly (20, figure 5-48, sheet 2) to the oil heat exchanger on the fuel heater assembly and to the power driven rotary (oil) pump. Tighten hose connectors as required. (Refer to table 11-3, reference number 96.)

j. Install clamps (24, 29, and 32) with scre 30, and 34) and nuts (26, 27, and 31) to bracke 28, and 33).

k. Position packings (13, figure 5-48, sheet connector (14) and position adapter (12) on inl housing.

NOTE

Do not tighten connector until hose asse bly (11) has been installed; repositioning of adapter may be necessary.

l. Connect hose assembly (11) to lubrication pres- e manifold (19) and to adapter (12). Tighten hose nectors as required. (Refer to table 11-3, refer- e number 98.)

m. Secure clamp (10) to bracket on compressor sing with screw (15) and nut (9).

n. Connect hose assembly (18) to lubrication pres- e manifold (19) and to No. 2 bearing oil-pressure ng to diffuser housing assembly. Tighten hose nectors.

NOTE

Prior to installation of hose assembly (1), ensure that chafing sleeve is positioned where hose may come in contact with air diffuser.

In following step o., when tightening connector as required (refer to table 11-3, reference number 107) on oil strainer housing adapter, use one wrench on adapter and one on connector to prevent adapter from turning.

. Connect hose assembly (1) to lubrication pres- manifold (19) and to oil strainer housing adapter p of combustion chamber assembly. Tighten connector on manifold and connector on oil iner housing adapters as required. (Refer to 11-3, reference number 107.)

. Secure hose assembly (1) to bracket on forward e of combustion chamber housing with screw (6) nut (8).

. Secure clamps (3 and 5) to combustion chamber ing with screws (2 and 4).

. REMOVAL OF TORQUE LIMITER MANIFOLD EMBLY (T53-L-15 Engine). (See figure 5-50.) eed as follows:

Disccnnect hose assembly (6) from fuel control e limiter.

Remove bolts (3) and remove hose assemblies d 1) and manifold assembly (2).

Remove manifold tee (7), union (8), and packing om inlet housing.

Remove union (5) and packing (4) from torque er.

INSTALLATION OF TORQUE LIMITER MANI- ASSEMBLY (T53-L-15 Engine). (See figure) Proceed as follows:

Install packing (4) and union (5) on fuel control limiter.

Install packing (9), union (8), and manifold tee inlet housing.

c. Position hose assemblies (6 and 1) and manifold assembly (2) and secure with bolts (3).

d. Connect hose assembly (1) to torque limiter.

e. Connect hose assembly (6) to manifold tee on inlet housing.

5-94. REMOVAL OF POWER TURBINE OIL STRAINER (T53-L-7/7A Engines). (See figure 5-51.) Proceed as follows:

a. Disconnect oil pressure hose connector from oil strainer housing (1).

b. Unscrew and remove oil strainer housing from adapter (4) and remove packing (2) and strainer (3) from power turbine oil nozzle.

5-95. MINOR SERVICING OF POWER TURBINE OIL STRAINER. Proceed as follows:

NOTE

In following step a., inspect strainer bore on models T53-L-15/701 engines.

a. Prior to cleaning, inspect power turbine oil strainer (3, figure 5-51, or 2, figure 5-52) for metallic chips. (Refer to paragraph 12-25 to determine source of contamination.)

b. Clean strainer, using fine, soft fiber brush. Rinse with drycleaning solvent (item 28, table 2-2). Air-dry.

c. Inspect strainer for clogging and damage. Replace strainer if clogging cannot be removed or damage is noted.

d. Inspect power turbine oil strainer housing adapter (4, figure 5-51, or 1, figure 5-52) for stripped and/or damaged threads. Replace adapter if threads cannot be repaired.

5-96. INSTALLATION OF POWER TURBINE OIL STRAINER (T53-L-7/7A Engines). (See figure 5-51.) Proceed as follows:

a. Screw strainer (3) onto power turbine oil nozzle and tighten finger-tight.

b. Install packing (2) on oil strainer housing (1).

c. Secure oil strainer housing (1) to adapter (4). Hold adapter with wrench and tighten housing as required. (Refer to table 11-3, reference number 79.) Lockwire housing.

NOTE

Before connecting No. 3 and 4 bearing pressure oil hoses, apply sealing and retaining compound (item 94, table 2-2), to threads of oil strainer housing. Use extreme care to prevent sealing compound from getting into strainer.

d. Connect No. 3 and 4 bearing pressure oil hoses.

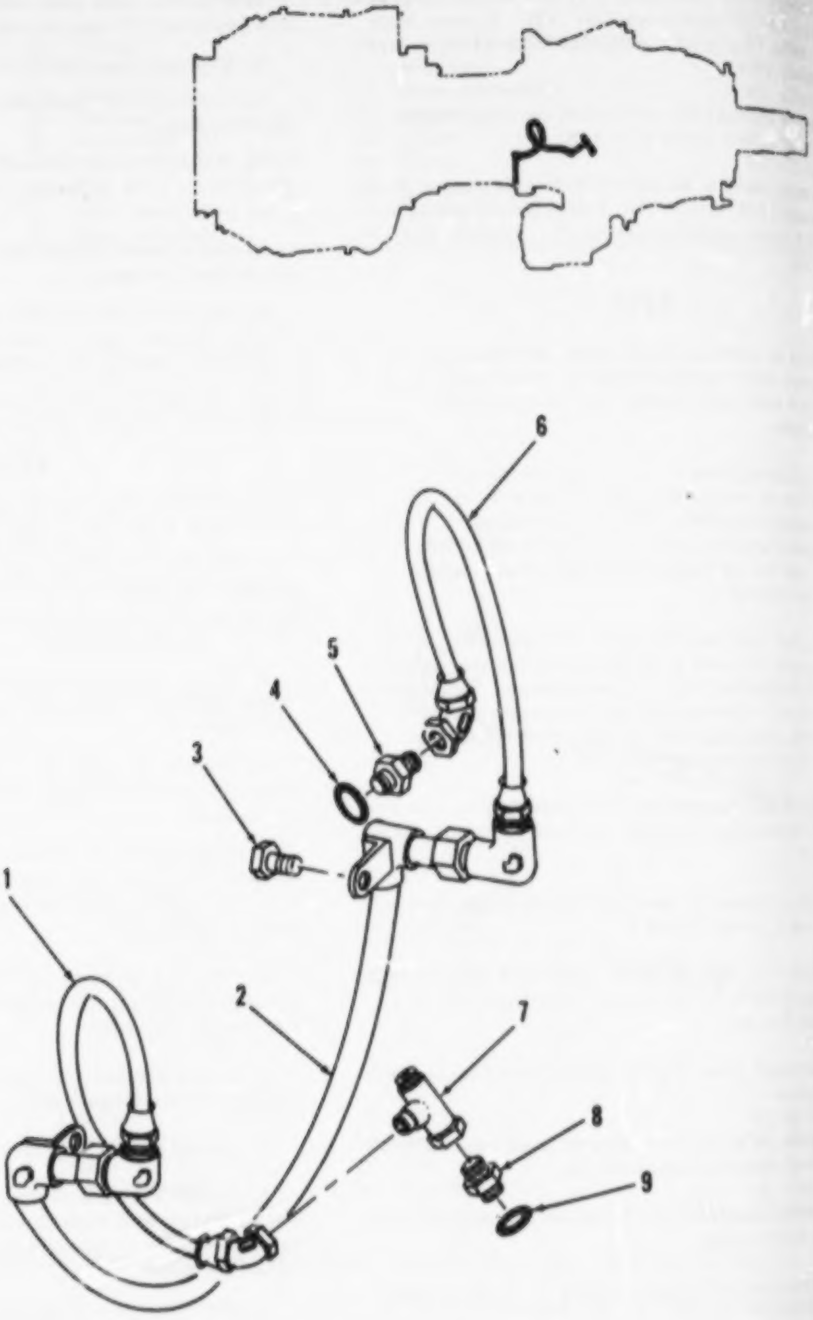
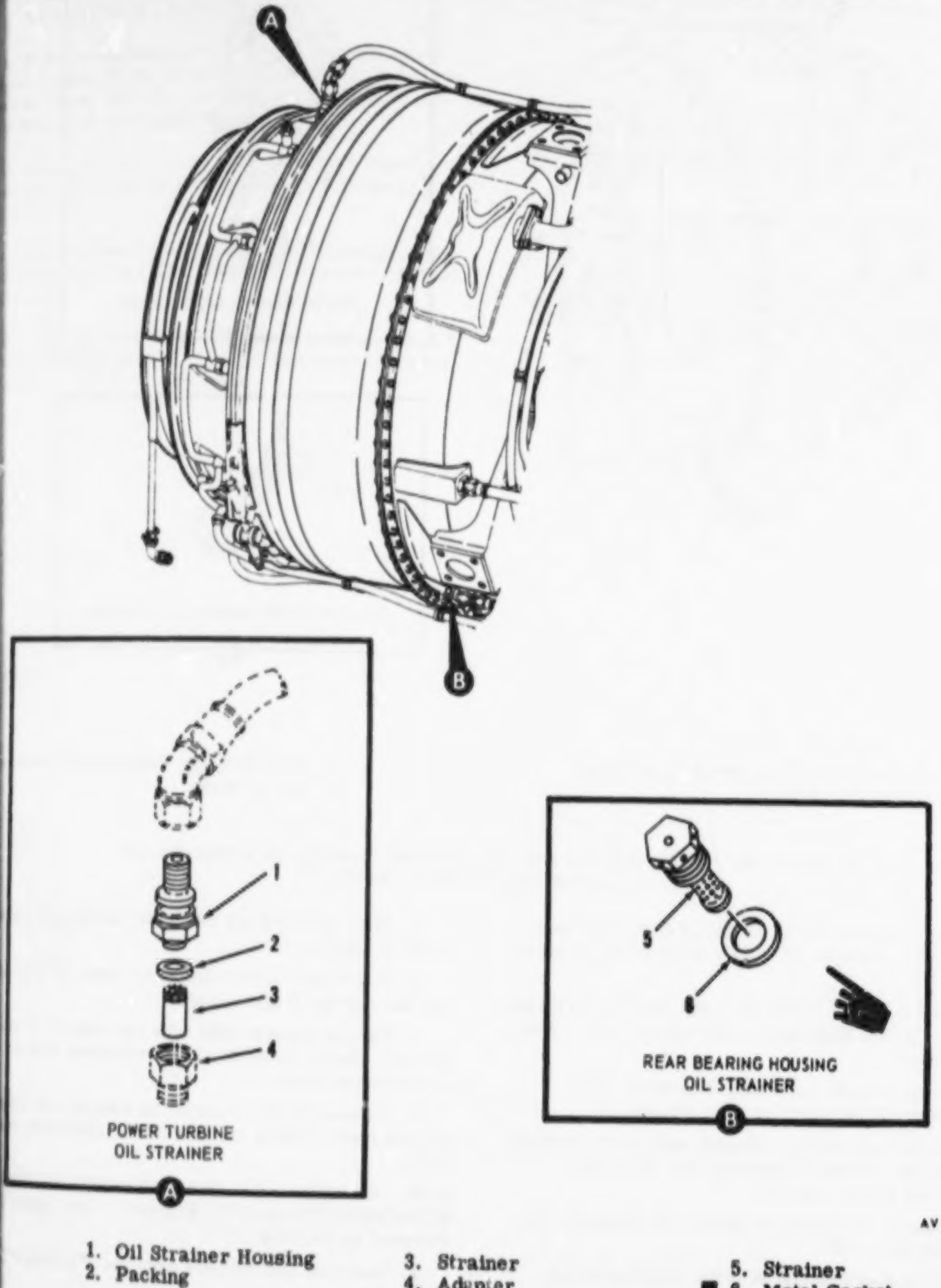


Figure 5-50. Torque Limiter Manifold Assembly and Attaching Parts (T53-L-15)

Key to Figure 5-50.

1. Hose Assembly
2. Manifold Assembly
3. Bolt
4. Packing
5. Union
6. Hose Assembly
7. Manifold Tee
8. Union
9. Packing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POWER TURBINE OIL STRAINER
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REAR BEARING HOUSING OIL STRAINER
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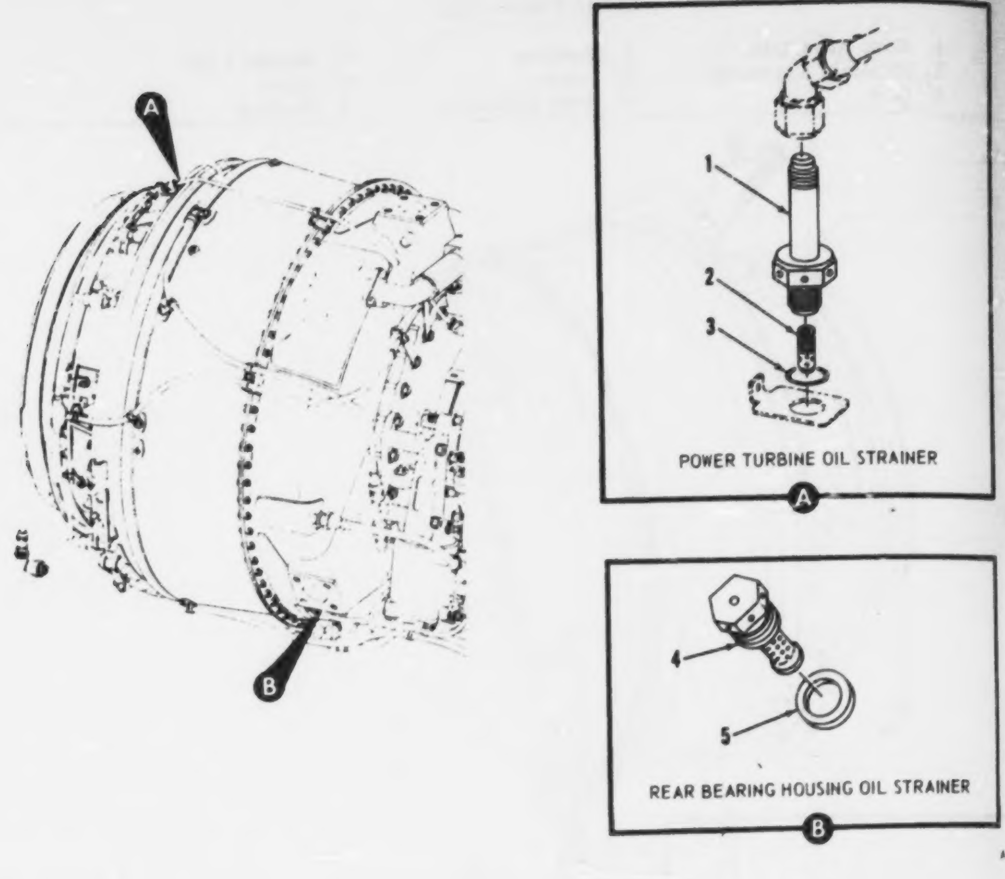
1. Oil Strainer Housing
2. Packing
3. Strainer
4. Adapter
5. Strainer
6. ■ Metal Gasket

Figure 5-51. Lubrication System Strainers and Related Parts (T53-L-7/7A)



1. Power Turbine Oil Strainer Housing Adapter
2. Power Turbine Oil Strainer
3. Packing
4. Rear Bearing Housing Oil
5. Metal Gasket

Figure 5-52. Power Turbine and Rear Bearing Housing Oil Strainers and Attaching Parts (T53-L-15/701)

e. Tighten mating nut as required (refer to table 11-3, reference number 80) while holding oil strainer with a wrench.

5-97. REMOVAL OF POWER TURBINE OIL STRAINER (T53-L-15/701 Engines). (See figure 5-52.) Proceed as follows:

a. Disconnect hose assembly connector from power turbine oil strainer housing adapter (1).

b. Unscrew and remove adapter and power turbine oil strainer (2). Remove packing (3). Unscrew strainer from within adapter.

c. For minor servicing of power oil strainer, refer to paragraph 5-95.

5-98. INSTALLATION OF POWER TURBINE OIL STRAINER (T53-L-15/701 Engines). (See figure 5-52.) Proceed as follows:

a. Place packing (3) on power turbine oil
housing adapter (1).

b. Screw power turbine oil strainer (2)
ter and tighten finger-tight.

c. Thread adapter into tube and tighten as
quired. (Refer to table 11-3, reference
Lockwire adapter.

d. Connect hose assembly to adapter and
as required. (Refer to table 11-3, reference
112.)

5-99. REMOVAL OF REAR BEARING
STRAINER (T53-L-7/7A Engines). (See
Proceed as follows:

a. Unscrew and remove strainer (5) from
housing.

b. Remove gasket (6).

00. MINOR SERVICING OF REAR BEARING USING OIL STRAINER. Proceed as follows:

NOTE

In following step a., inspect strainer bore on T53-L-15/701 engines.

. Prior to cleaning, inspect rear bearing hous-oil strainer (5, figure 5-51, or 4, figure 5-52) for allic chips. (Refer to paragraph 12-25 to deter-e source of contamination.)

. Clean strainer, using fine, soft fiber brush. e with drycleaning solvent (item 28, table 2-2). -dry.

. Inspect strainer for clogging and damage. Re-e strainer if clogging cannot be removed or dam-is noted.

1. INSTALLATION OF REAR BEARING HOUS-OIL STRAINER (T53-L-7/7A Engines). (See fig-5-51.) Proceed as follows:

CAUTION

Rear bearing housing oil strainer (5) 1-110-114-01 shall be installed only in diffuser housing 1-110-230-01, and strainer 1-110-114-05 shall be installed only in diffuser housing 1-110-210-05.

NOTE

The internal oil passage ID of the 1-110-114-01 oil strainer is 0.062 to 0.064 inch. The internal oil passage ID of the 1-110-114-05 strainer is 0.134 to 0.136 inch.

a. Position metal gasket (6) on rear bearing housing oil strainer (5).

b. Install strainer, packing, and gasket in diffuser housing and tighten strainer as required. (Refer to table 11-3, reference number 81A.) Lockwire.

OVAL OF REAR BEARING HOUSING ER (T53-L-15/701 Engines). (See figure

ear bearing (No. 2) housing oil strainer a fitting at the 4-o'clock position on the sing.

exagon portion of rear bearing housing counterclockwise and lift out strainer.

ve and discard metal gasket (5).

inor servicing of rear bearing housing oil efer to paragraph 5-100.

TALLATION OF REAR BEARING HOUS- RAINER (T53-L-15/701 Engines). (See .) Proceed as follows:

CAUTION

rear bearing housing oil strainer 110-114-08 shall be installed in er housing 1-110-230-08.

NOTE

bearing housing oil strainer 1-110- has an oil passage ID of 0.0755 to inch.

new metal gasket (5) on rear bearing trainer (4).

strainer into diffuser housing. Tighten and lockwire. (Refer to table 11-3, ref- er 81A.)

OVAL OF POWER-DRIVEN ROTARY . (See figure 5-53.) Proceed as follows:

nect electrical connector (1) from oil -sensing bulb (2).

-L-7/7A engines, disconnect fuel heater by removing bolt (21) and gaskets (17 elbow (tee) (18). Allow elbow to remain el heater oil hose.

nect aircraft hoses from pressure oil).

rotary (oil) pump (5) and remove bolts washers (7 and 15).

CAUTION

cover all exposed openings.

NOTE

llation of a new pump is necessary, oil temperature bulb and packing l pump housing. (Refer to para- -141.)

e. Remove rotary (oil) pump (5).

f. Remove and discard packings (9, 11, and 13).

g. Withdraw rotary (oil) pump drive shaft (10) from accessory drive gearbox.

5-105. INSTALLATION OF POWER-DRIVEN ROTARY (OIL) PUMP. (See figure 5-53.) Proceed as follows:

a. Insert rotary (oil) pump drive shaft (10) in accessory drive gearbox, mating spline with oil pump drive in accessory drive gearbox.

b. Install new packings (9, 11, and 13). Mount rotary (oil) pump (5) on accessory drive gearbox pad over exposed end of rotary (oil) pump drive shaft (10). Secure with bolts (6 and 16) and washers (7 and 15). Tighten and lockwire bolts.

CAUTION

Installation of airframe elbow must be in accordance with design standard AND10064. If elbow is threaded too far into the oil pump, oil flow will be restricted causing low oil pressure and possible engine oil starvation.

Dirty filter discs can cause low oil pressure.

c. Check oil filter for cleanliness. (Refer to paragraphs 7-16 and 5-109.)

d. On T53-L-7/7A engines install fuel heater oil hose (19) as follows:

(1) Install elbow (tee) (18) on fuel heater oil hose from installing elbow (tee).

(2) Connect aircraft hoses to pressure oil inlet port (22).

(3) Install gasket (20) on bolt (21) and insert bolt into elbow. Install another gasket (17) on bolt and secure elbow and hose to scavenge oil outlet port.

e. If removed, install oil temperature-sensing bulb (2). (Refer to paragraph 5-142.)

f. Connect electrical connector (1) to temperature-sensing bulb. (Refer to paragraphs 5-122, 5-124, and 5-126.)

5-106. ADJUSTMENT OF POWER-DRIVEN ROTARY (OIL) PUMP. (See figure 5-54.)

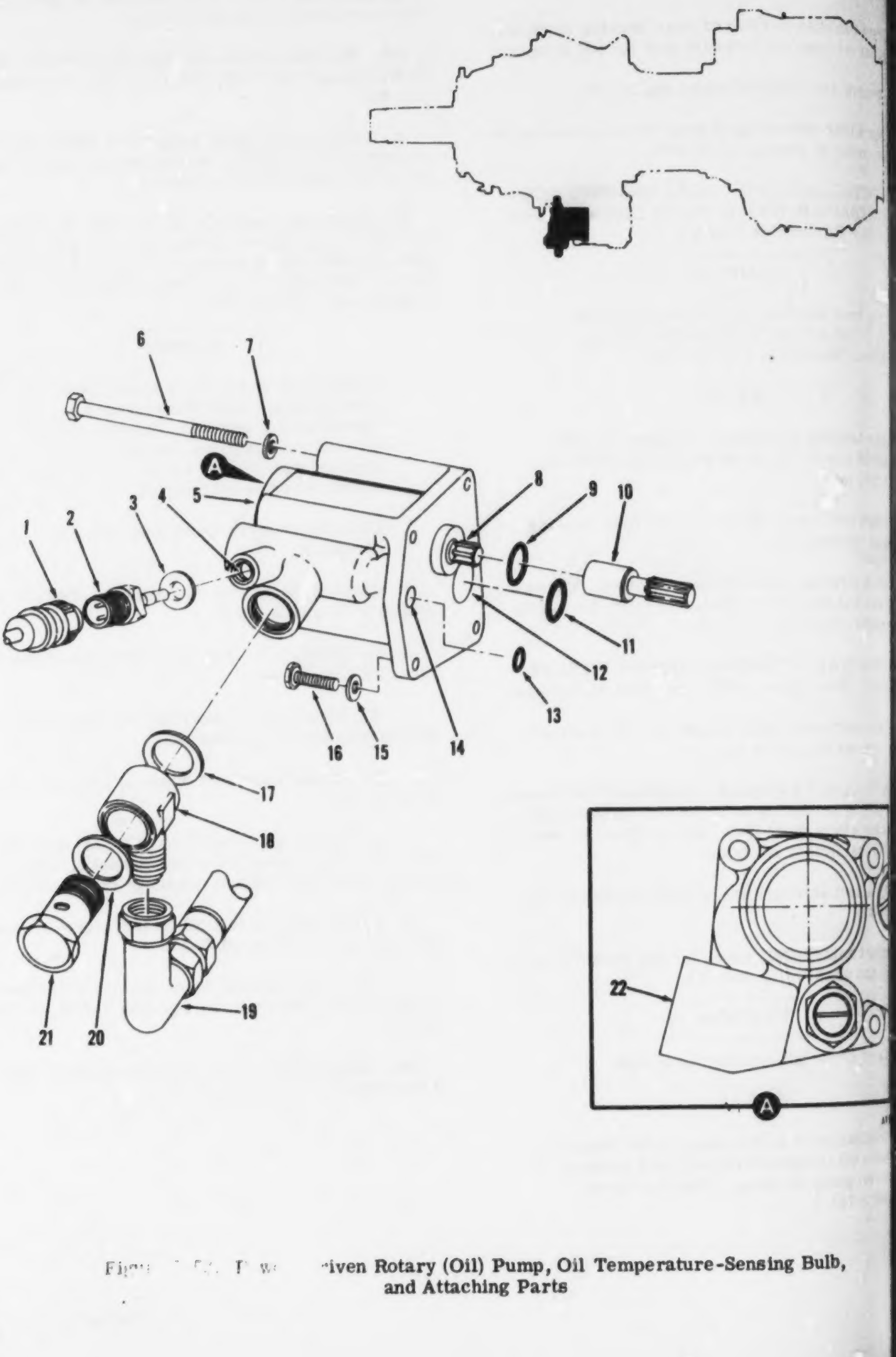

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Figure [illegible]. Power-driven Rotary (Oil) Pump, Oil Temperature-Sensing Bulb, and Attaching Parts

Key to Figure 5-53.

lectrical Connector
il Temperature-Sensing Bulb
acking
emperature-Sensing Bulb Port
otary (Oil) Pump
olt
asher
ump Rotor
acking
otary (Oil) Pump Drive Shaft
acking

12. Scavenge Oil Inlet
13. Packing
14. Pressure Oil Outlet
15. Washer
16. Bolt
17. Gasket (T53-L-7/7A Engines)
18. Elbow (tee) (T53-L-7/7A Engines)
19. Fuel Heater Oil Hose (T53-L-7/7A Engines)
20. Gasket (T53-L-7/7A Engines)
21. Bolt (T53-L-7/7A Engines)
22. Pressure Oil Inlet Port

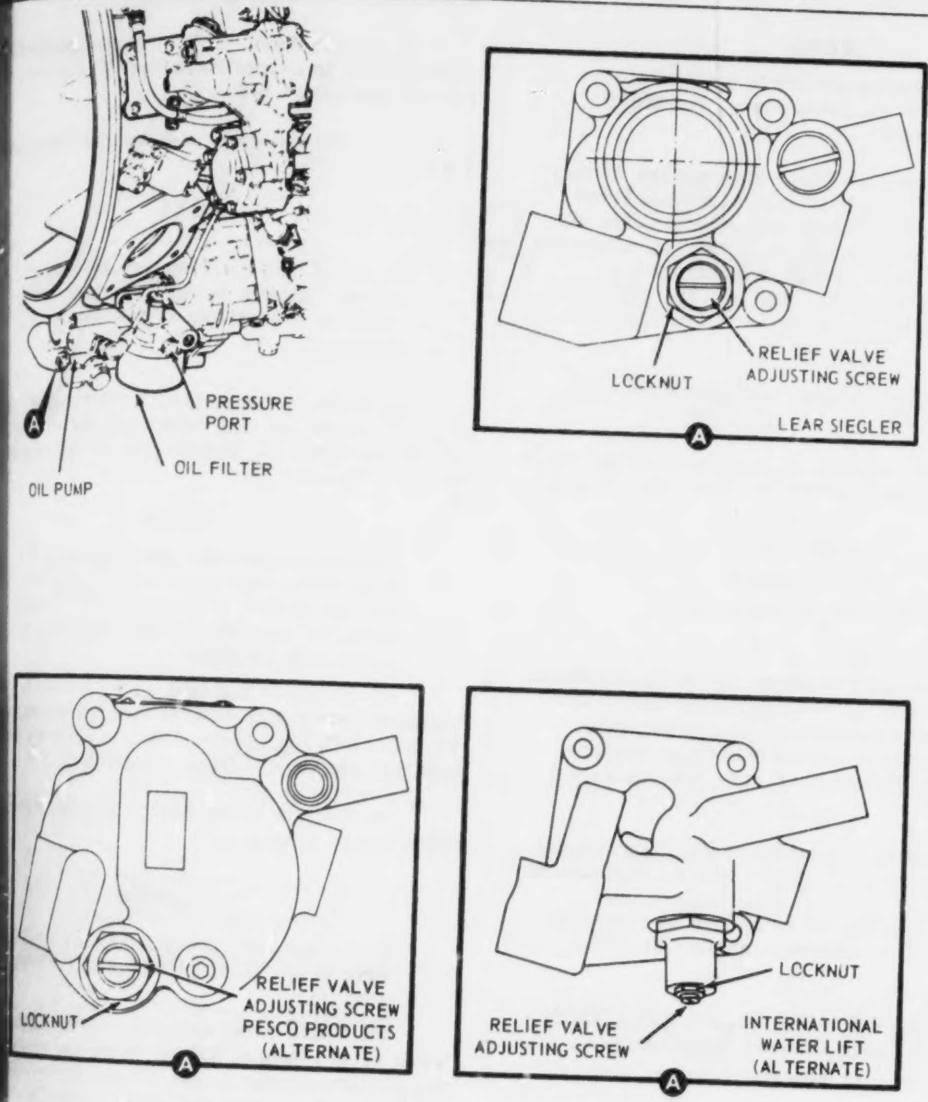

A
PRESSURE PORT
OIL FILTER
OIL PUMP
LOCKNUT
RELIEF VALVE ADJUSTING SCREW
LEAR SIEGLER
A
LOCKNUT
RELIEF VALVE ADJUSTING SCREW
PESCO PRODUCTS (ALTERNATE)
A
LOCKNUT
RELIEF VALVE ADJUSTING SCREW
INTERNATIONAL WATER LIFT (ALTERNATE)
A
AV 082660
X-854

Figure 5-54. Power-Driven Rotary (Oil)Pump - Adjustment

fore making any oil pump pressure adjust-
roughly check aircraft oil pressure system,
cockpit gage, for proper operation.

b. Check oil inlet fitting to ensure that fitting is not bottomed in pump inlet.

CAUTION

Installation of airframe elbow must be in accordance with design standard AND10064. If elbow is threaded too far into the oil pump, oil flow will be restricted causing low oil pressure and possible engine oil starvation.

Dirty filter discs can cause low oil pressure.

c. Check oil filter for cleanliness. (Refer to paragraphs 7-16 and 5-109.)

NOTE

Normal operating pressures apply at sea level, normal rated power, and 200°F oil temperature.

d. Operate engine and check oil pressure. Normal pressures should be 60 to 80 psig at normal rated power and above, and 25 psig minimum at flight idle for T53-L-7/7A engines; and 80 to 100 psig at normal rated power and above, and 25 psig minimum at flight idle for T53-L-15/701 engines. The readings should be taken after oil pressure and temperature have stabilized.

e. Attach a pressure gage to oil filter pressure tap port.

f. Start engine (refer to paragraph 10-8) and check oil pressure according to limits in preceding step d.

WARNING

Do not adjust pressure during engine operation.

g. If it is necessary to adjust pressure, shut down engine and loosen relief valve adjusting screw locknut. Turn adjusting screw clockwise to increase pressure or counterclockwise to reduce pressure. One full turn will change pressure approximately 8 psi.

h: Restart engine. Check oil pressure and repeat adjustments in preceding steps f. and g., as necessary.

i. Tighten adjusting screw locknut as required. (Refer to table 11-3, reference number 75.) Lockwire.

5-107. REMOVAL OF LUBE OIL FILTER ASSEMBLY. (See figure 5-55.) Proceed as follows:

NOTE

On T53-L-7/7A engines allow bracket to remain attached to clamp on electrical cable assembly.

a. Straighten tabwashers (4) on the two upper mounting bolts (5). Support oil filter (7) and remove mounting bolts, bracket (3) (rigid connecting link T53-L-15/701 engines), and washers (6).

b. Withdraw oil filter (7) and remove pack
(1 and 2).

5-108. DISASSEMBLY OF LUBE OIL FILTE SEMBLY. (See figure 5-56.) Proceed as follo

a. Loosen bolt that secures filter cover
(3) to filter housing subassembly (1) and with
cover assembly.

b. Remove packing (2).

5-109. MINOR SERVICING OF LUBE OIL FI ASSEMBLY. Proceed as follows:

a. If, upon removal of filter cover assem
figure 5-56), an excessive amount of chips ar
refer to paragraph 4-6.

b. Clean filter elements as follows: (See f
5-57.)

NOTE

On model T53-L-15/701, if impending bypass indicator button is extended, clean filter elements as outlined in paragraph 7-16.

(1) Place cleaning fixture (SPT107) (1,
5-57) on screw and turn down until it fits
against end plate (3). Install plug or cap on
nipple of fixture.

NOTE

The fixture prevents particles larger than 40 microns from entering inside section of filter elements. It shall be installed immediately upon removal of cover from housing.

(2) Immerse and soak cover assembly,
cleaning fixture installed, in drycleaning so
28, table 2-2) until contaminant is removed
external surfaces of filter elements (5).

(3) Remove cover assembly from solv
move cap or plug.

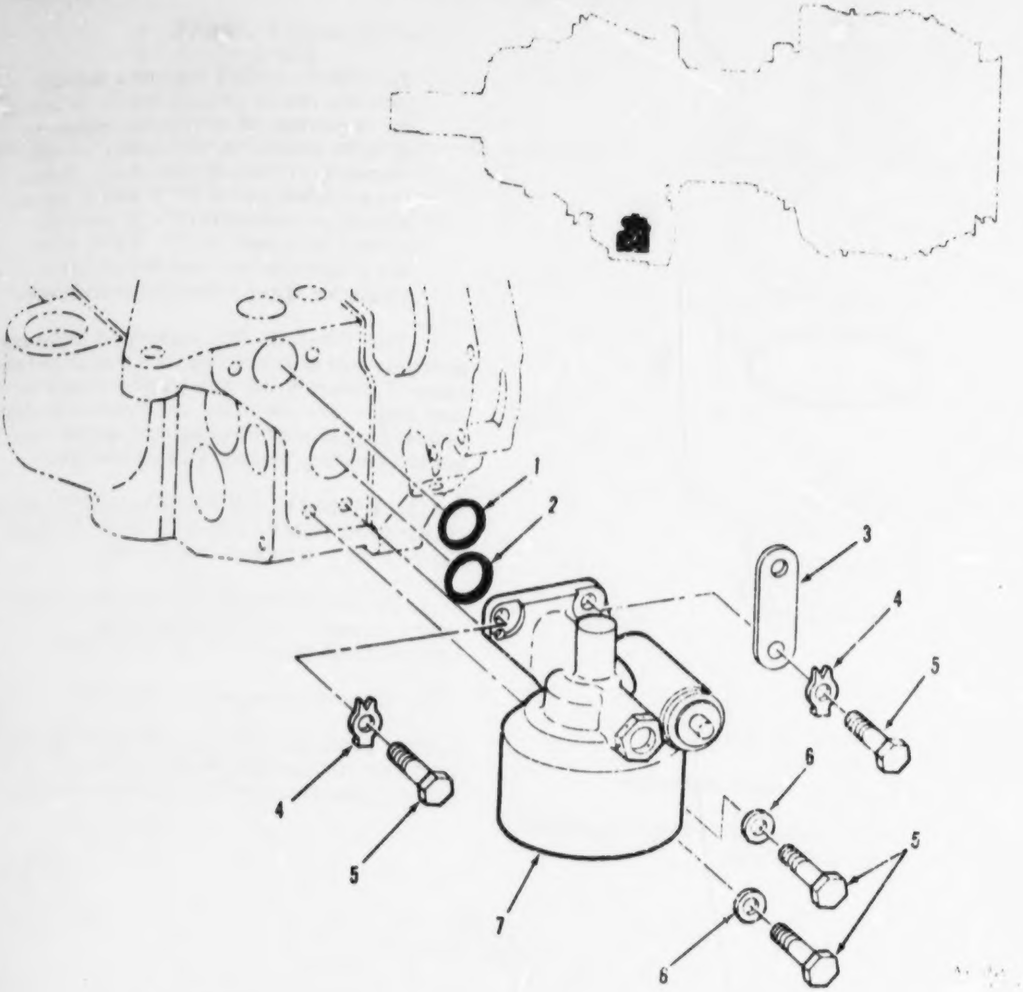
CAUTION

Only clean, dry pressurized air shall
used to dry filter elements in following
step (4).

(4) Place cover assembly under run
water or in a tank of boiling water and blow
dry air through air line at 100 psi maximum
tinue rinsing process until there is no disc

(5) Remove cleaning fixture from scr
cover assembly with clean, dry air.

c. If cleaning in preceding step b. is not
disassemble filter cover assembly (refer to
graph 6-36) and clean as outlined in parag



1. Packing
2. Packing
3. Bracket (Rigid Connecting Link T53-L-15/701 Engines)
4. Tabwasher
5. Bolt
6. Washer
7. Lube Oil Filter

Figure 5-55. Lube Oil Filter and Attaching Parts (Typical)

. ASSEMBLY OF LUBE OIL FILTER ASSEM- (See figure 5-56.) Proceed as follows:

Install packing (2) in groove on OD of cover.

Install filter cover assembly (3) into filter g subassembly (1).

Tighten bolt to 20 to 35 pound-inches torque. ire bolt to housing.

INSTALLATION OF LUBE OIL FILTER BLY. (See figure 5-55.) Proceed as follows:

Install packings (1 and 2).

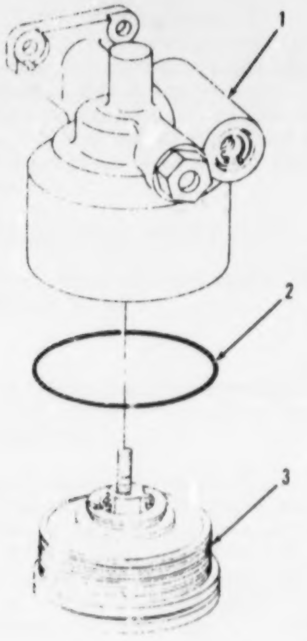
b. Mount lube oil filter (7) on accessory drive gearbox.

NOTE

In the following step c. for T53-L-15/701 engines, rigid connecting link (3) shall be perpendicular to centerline of engine.

c. Install upper bolts (5), tabwashers (4), and bracket, (rigid connecting link T53-L-15/701 Engines) (3) with attached clamp.

d. Install lower bolts (5) and washers (6).



1. Filter Housing
2. Packing
3. Filter Cover Assembly

Figure 5-56. Lube Oil Filter Assembly - Exploded View (Typical)

e. Tighten all bolts. Lockwire lower bolts.

NOTE

For T53-L-15/701 engines a thermal lock-out device is installed in the indicator to prevent an erroneous bypass indication caused by the temporary high viscosity of cold-thickened oil. Indicator actuation below 52°F with no associated filter contamination is generally caused by a malfunction of the indicator's thermal lock-out device and is cause for filter assembly replacement.

f. For T53-L-15/701 engines, if impending indicator button located on differential pressure cator (7, figure 6-35) was found extended during itial inspection and filter was found to be clean, indicator position following next engine runup. ton is extended, replace filter assembly.

5-112. REMOVAL OF POWER-DRIVEN ROTAR (BOOSTER) PUMP (T53-L-7/7A/15 Engines). figure 5-58.) Proceed as follows:

a. Remove bolts (1) and washers (2) th power-driven rotary (booster) pump (3) governor and tachometer drive assemb

b. Remove pump and packing (4).

5-113. INSTALLATION OF POWER-DRIVEN ROTARY (BOOSTER) PUMP (T53-L-7/7A/15 Engines). (See figure 5-58.) Proceed as follows:

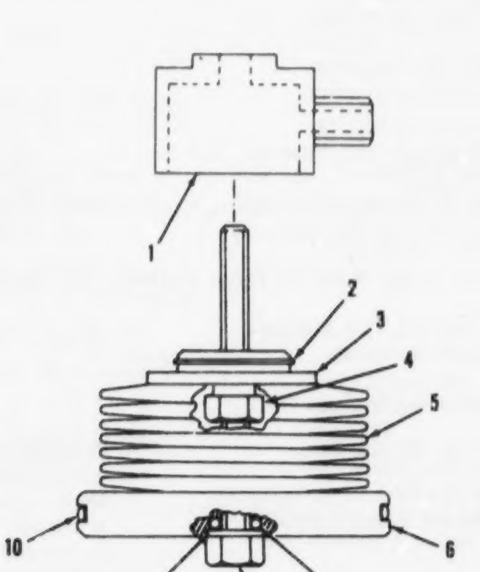
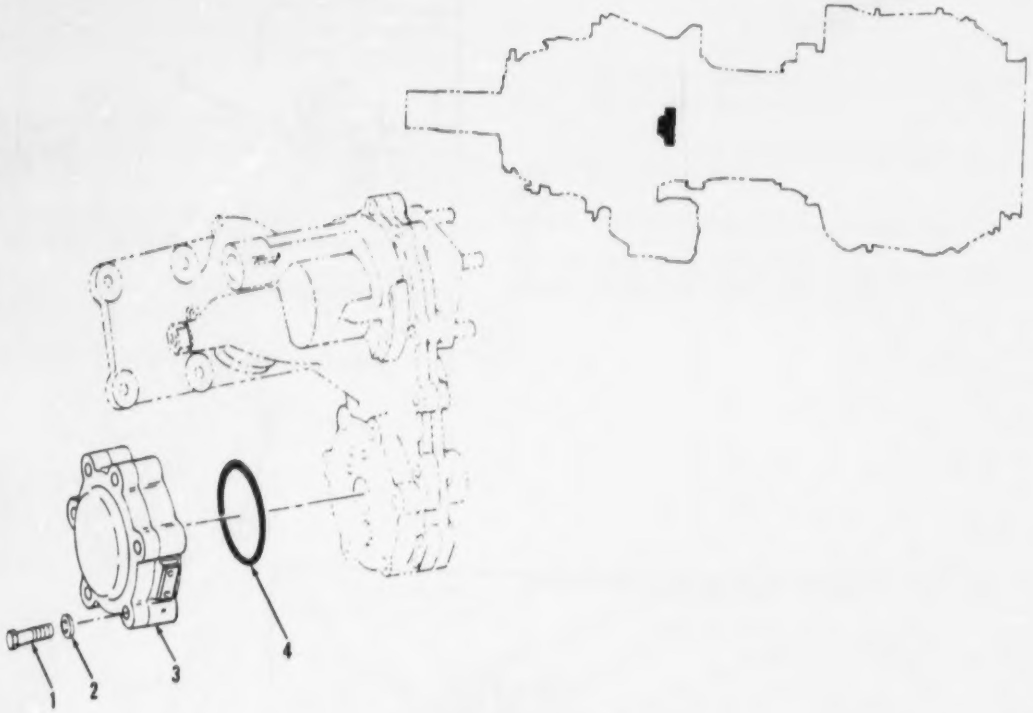


Figure 5-57. Oil Filter Cover Assembly

Key to Figure 5-57.

1. Cleaning Fixture (SPT107)
2. Retaining Ring
3. End Plate
4. Locknut
5. Filter Element
6. Cover
7. Packing
8. Screw
9. Washer
10. Packing



1. Bolt
2. Washer
3. Power-Driven Rotary (Booster) Pump
4. Packing

Figure 5-58. Power-Driven Rotary (Booster) Pump and Attaching Parts (T53-L-7/7A/15)

a. Establish proper end float of overspeed gover- or drive shaft. (Refer to paragraph 5-78.)

b. Install packing (4) in power-driven rotary ooster) pump (3).

c. Mount pump on overspeed governor and tachom- er drive housing, mating its splined shaft within erspeed governor cover.

d. Secure pump with washers (2) and bolts (1). ckwire bolts.

114. ADJUSTMENT OF TORQUEMETER OIL ESSURE (T53-L-7/7A/15 Engines). (See figure 59.) Proceed as follows:

a. Remove plug from overspeed governor and tachometer drive and install pressure gage that provides readings of 0 to 200 psi.

NOTE

In following step b., the required minimum pressure at 1550 prop rpm or above is 140 psig. Readings should be taken after oil pressure and temperature have stabilized.

b. Start engine (refer to paragraph 10-8), and check torquemeter oil pressure.

c. Shut down engine and make following adjustments.

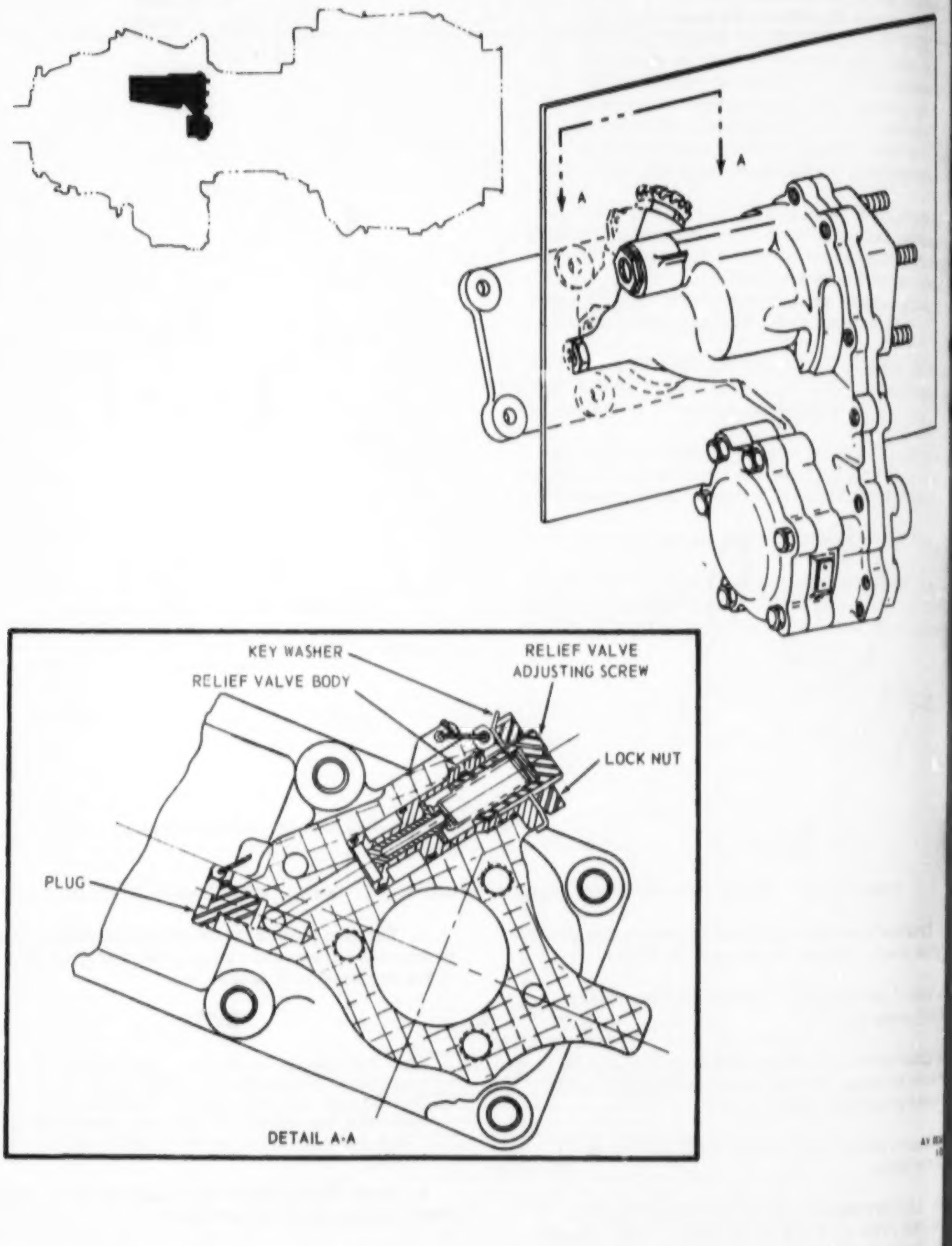

A
A
KEY WASHER
RELIEF VALVE BODY
RELIEF VALVE ADJUSTING SCREW
LOCK NUT
PLUG
DETAIL A-A

Figure 5-59. Torquemeter Oil Pressure Adjustment (T53-L-7/7A/15)

(1) Straighten tang on key washer.

NOTE

On T53-L-7/7A engines, it will be necessary to displace air pressure-sensing hose when using wrench.

(2) Loosen adjusting screw locknut, using ch (LTCT215).

(3) Turn adjusting screw clockwise to increase ure or counterclockwise to decrease pressure. ull turn will change pressure approximately i.

(4) Tighten adjusting screw locknut as required to table 11-3, reference number 77) using ch (LTCT215).

(5) Deform tangs on key washers; one tang t relief valve body and one against locknut.

(6) Restart engine. Recheck oil pressure and t adjustment, as necessary.

Remove pressure gage and reinstall plug.

5-115. REMOVAL OF CHIP DETECTOR. (See figure 5-60.) Proceed as follows:

a. Disconnect wiring harness (3), from chip detector (2).

NOTE

Provide a suitable container for draining residual oil.

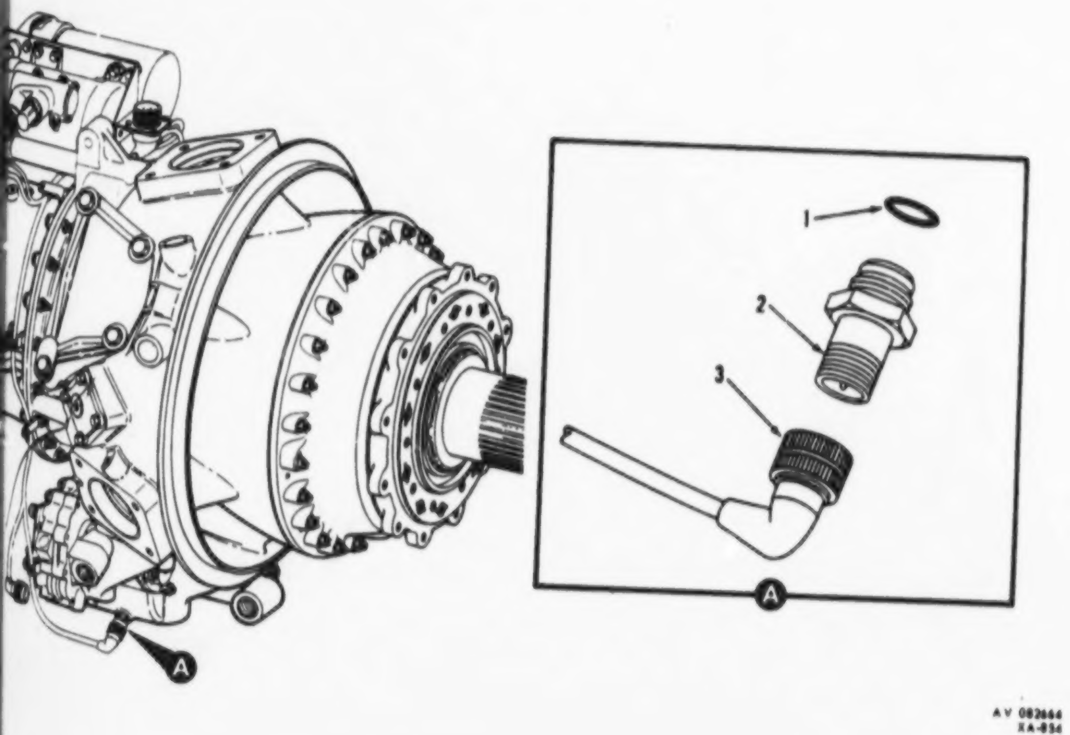
CAUTION

Do not wipe detector clean until it has been inspected for chips.

b. Unscrew and remove chip detector (2) from accessory drive gearbox.

c. Remove packing (1) from chip detector.

5-116. INSTALLATION OF CHIP DETECTOR. (See figure 5-60.) Proceed as follows:



1. Packing
2. Chip Detector
3. Wiring Harness

Figure 5-60. Chip Detector and Attaching Parts

NOTE

In following step a., if threads on chip detector port were repaired as outlined in paragraph 7-137, install packing, AN6227-10, in place of packing (1).

Check detector to ensure that it is clean.

a. Place packing (1, figure 5-60) on chip detector (2).

b. Screw chip detector (2) with packing (1) into accessory drive gearbox.

c. Tighten chip detector. (Refer to table 11-3, reference numbers 81 and 97.)

CAUTION

In following step d. , no more than 15 pound-inches of torque shall be applied to the chip detector centerpost nut whe installing chip detector wire.

d. Connect wiring harness (3) to chip dete

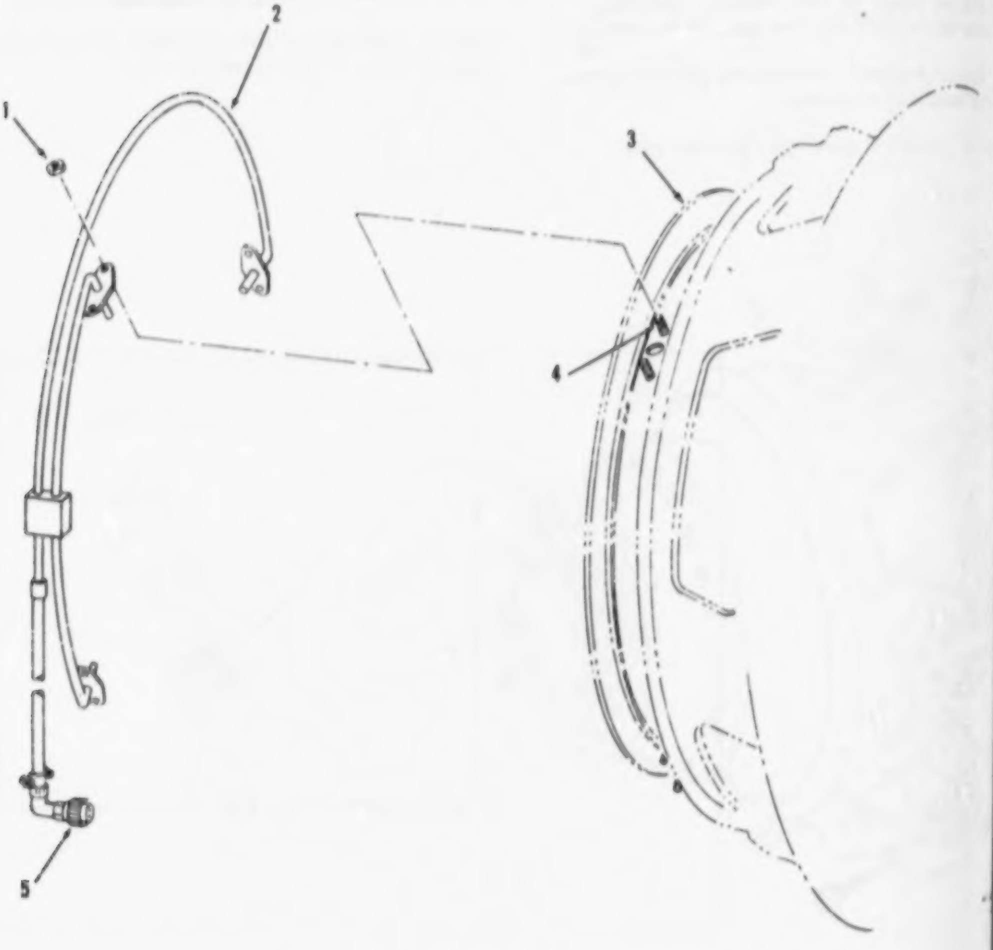
e. Lockwire as required.

5-117. REMOVAL OF EXHAUST THERMOC ASSEMBLY (T53-L-7/7A Engines). (See fig

Proceed as follows:

a. Disconnect connector (5).

b. Remove nuts (1) that retain exhaust the couple harness (2) to exhaust diffuser (3).



1. Nut
2. Exhaust Thermocuple Harness
3. Exhaust Diffuser
4. Stud
5. Connector

Figure 5-61. Exhaust Thermocouple Assembly and Attaching Parts (T53-L-7/7A)

CAUTION

Extreme caution shall be taken when removing the thermocouple assembly from exhaust diffuser (always remove end probes first). Excessive flexing of thermocouple assembly, specifically at probe locations, can lead to internal breakage and shorting. Never use pliers or sharp objects to pry probes or adjacent harness loose from diffuser.

c. Remove thermocouple harness from studs (4).

5-118. INSTALLATION OF EXHAUST THERMOCOUPLE ASSEMBLY (T53-L-7/7A Engines).

(See figure 5-61.) Proceed as follows:

a. Position exhaust thermocouple harness (2) over exhaust diffuser (3) with connector (5) to right of engine.

CAUTION

treme caution shall be taken when in-
alling thermocouple assembly on ex-
ust diffuser. Excessive flexing of ther-
ocouple assembly, specifically at probe
cations, can lead to internal breakage
d shorting. Never use pliers or sharp
jects on probes or adjacent harness.

sert thermocouple in exhaust diffuser at 1-,
10-o'clock positions.

pply Ease-Off Lubricant (item 32, table 2-2)
kote antiseize thread compound (item 78,
2) to nuts (1) and secure exhaust thermocouple
(2) to exhaust diffuser studs (4). Tighten
efer to table 11-3, reference number 46.)

NOTE

hen connecting the thermocouple harness
the airframe/engine firewall, the knurled
g nut on the thermocouple assembly con-
ctor (5) shall be hand-tightened only, and
kwired.

REMOVAL OF EXHAUST THERMOCOUPLE
LY (T53-L-15/701 Engines). (See figure
Proceed as follows:

move nuts (2) that retain exhaust thermo-
ssembly (1) to exhaust diffuser.

CAUTION

treme caution shall be taken when re-
ving the thermocouple assembly from
haust diffuser (always remove end
obes first). Excessive flexing of ther-
couple assembly, specifically at probe
cations, can lead to internal breakage
d shorting. Never use pliers or sharp
jects to pry probes or adjacent harness
se from diffuser.

move exhaust thermocouple assembly from

NSTALLATION OF EXHAUST THERMO-
ASSEMBLY (T53-L-15/701 Engines). (See
-62.) Proceed as follows:

CAUTION

treme caution shall be taken when in-
alling thermocouple assembly on exhaust
fuser. Excessive flexing of thermo-
uple assembly, specifically at probe
cations, can lead to internal breakage
d shorting. Never use pliers or sharp
jects on probes or adjacent harness.

ert thermocouple ends into exhaust diffuser
the 12-, 2-, 4-, 6-, 8-, and 10-o'clock

b. Apply Ease-Off Lubricant (item 32, table 2-2) or Molykote antiseize thread compound (item 78, table 2-2) to nuts (2, figure 5-62) and secure exhaust thermocouple assembly (1) to exhaust diffuser with nuts. Tighten nuts. (Refer to table 11-3, reference number 110.)

NOTE

When connecting the thermocouple harness to the airframe/engine firewall, the knurled ring nut on the thermocouple assembly connector (3) shall be hand-tightened only, and lockwired.

5-121. REMOVAL OF ELECTRICAL CABLE ASSEMBLY (T53-L-7/7A Engines).

(See figure 5-63.) Proceed as follows:

WARNING

Make certain that all electrical power is disconnected and ignition unit is grounded.

a. Disconnect airframe main connector (A).

b. Remove screws, nuts, and clamps that secure the electrical cable assembly (29) to the engine.

NOTE

To facilitate reassembly, tag and identify each connector with its respective component.

c. Disconnect each of the following connectors: hot-air solenoid valve connector (J), chip detector connector (I), compressor rotor (N1) tachometer generator connector (H), ignition unit connector (B), fuel filter pressure switch connector (C), power turbine (N2) tachometer generator connector (D), starting fuel solenoid valve connector (E), fuel control solenoid valve connector (F), and oil temperature-sensing bulb connector (G).

d. Remove screws (3) and nuts (18), and remove airframe main connector (A) from bracket.

e. Remove electrical cable assembly (29).

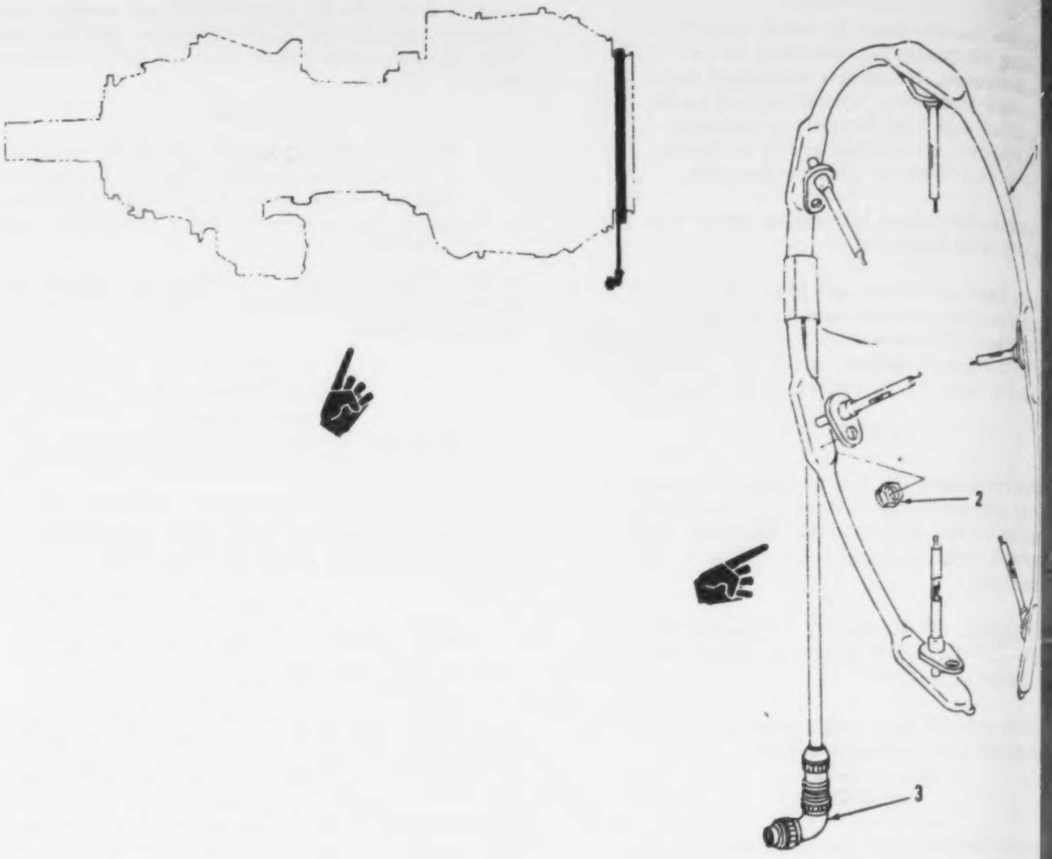
5-122. INSTALLATION OF ELECTRICAL CABLE ASSEMBLY (T53-L-7/7A Engines).

(See figure 5-63.) Proceed as follows:

a. Position electrical cable assembly (29) on engine with connectors for oil temperature-sensing bulb and fuel control solenoid valve on left side.

b. Install airframe main connector (A) in bracket and secure with screws (3) and nuts (18).

c. Attach following connectors to their respective component: hot-air solenoid valve connector (J), ignition unit connector (B), chip detector connector (I), starting fuel solenoid valve connector (E), oil temperature-sensing bulb connector (G), fuel control solenoid valve connector (F), fuel filter pressure switch connector (C), compressor rotor (N1) tachometer generator connector (H), power turbine (N2) tachometer generator connector (D). (Refer to paragraph 5-142 for installation of oil temperature-sensing bulb.)



1. Exhaust Thermocouple Assembly 2. Nut 3. Connector

Figure 5-62. Exhaust Thermocouple Assembly and Attaching Parts (T53-L-15/701)

d. Attach fuel filter pressure switch connector (C) and chip detector connector (I) to their respective components.

e. Install screws, nuts, and clamps that secure the electrical cable assembly (29) to the engine.

5-123. REMOVAL OF ELECTRICAL CABLE ASSEMBLY (T53-L-15 Engine). (See figure 5-64.) Proceed as follows:

NOTE

Index each connector to facilitate reassembly.

a. Remove all screws and nuts that secure electrical cable assembly clamps (2, 5, 7, 8, 18, and 19) to engine.

b. Disconnect electrical plug at airframe main connector (A).

NOTE

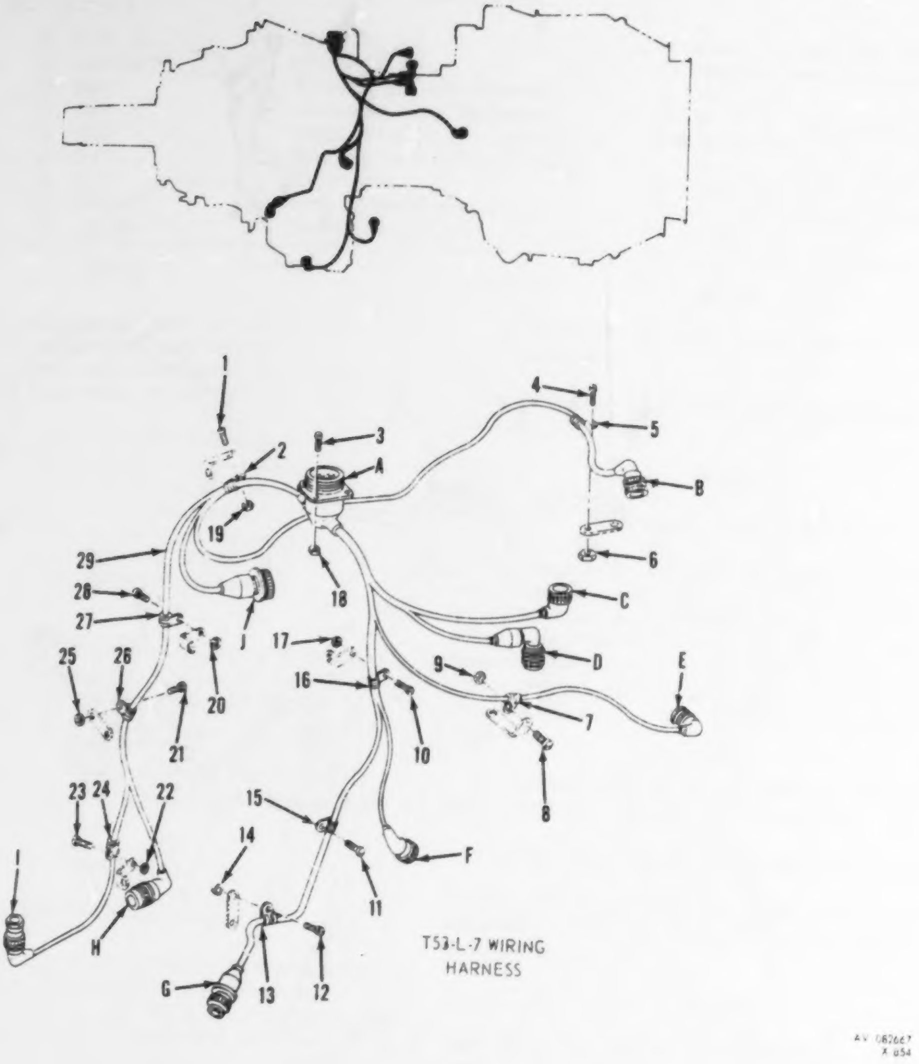
Connector (F) is not used.

c. Disconnect electrical cable assembly (2 each of following connectors: oil temperature (G), starting fuel solenoid valve (C), fuel filter sure switch (D), power turbine (N2) tachomete erator (E), hot-air solenoid valve (J), compres rotor (N1) tachometer generator (H), chip dete (I), and ignition unit input (B).

d. Remove screws (3) and nuts (13) that se airframe main connector (A) to bracket.

e. Remove electrical cable assembly from

5-124. INSTALLATION OF ELECTRICAL CA ASSEMBLY (T53-L-15 Engine). (See figure 5 Proceed as follows: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23 24
22
15
F
14
11
I
H
13
12
G
T53-L-7 WIRING HARNESS
AV 082667
X 054

13. Clamp
14. Nut
15. Clamp
16. Clamp
17. Nut
18. Nut
19. Nut
20. Nut
21. Screw
22. Nut
23. Screw
24. Clamp
25. Nut
26. Clamp
27. Clamp
28. Screw
29. Electrical Cable Assembly
A. Airframe Main Connector
B. Ignition Unit Connector
C. Fuel Filter Pressure Switch Connector
D. Power Turbine (N2) Tachometer Generator Connector
E. Starting Fuel Solenoid Valve Connector
F. Fuel Control Solenoid Valve Connector
G. Oil Temperature-Sensing Bulb Connector
H. Compressor Rotor (N1) Tachometer Generator Connector
I. Chip Detector Connector
J. Hot-Air Solenoid Valve Connector

Figure 5-63. Electrical Cable Assembly and Attaching Parts (T53-L-7/7A)

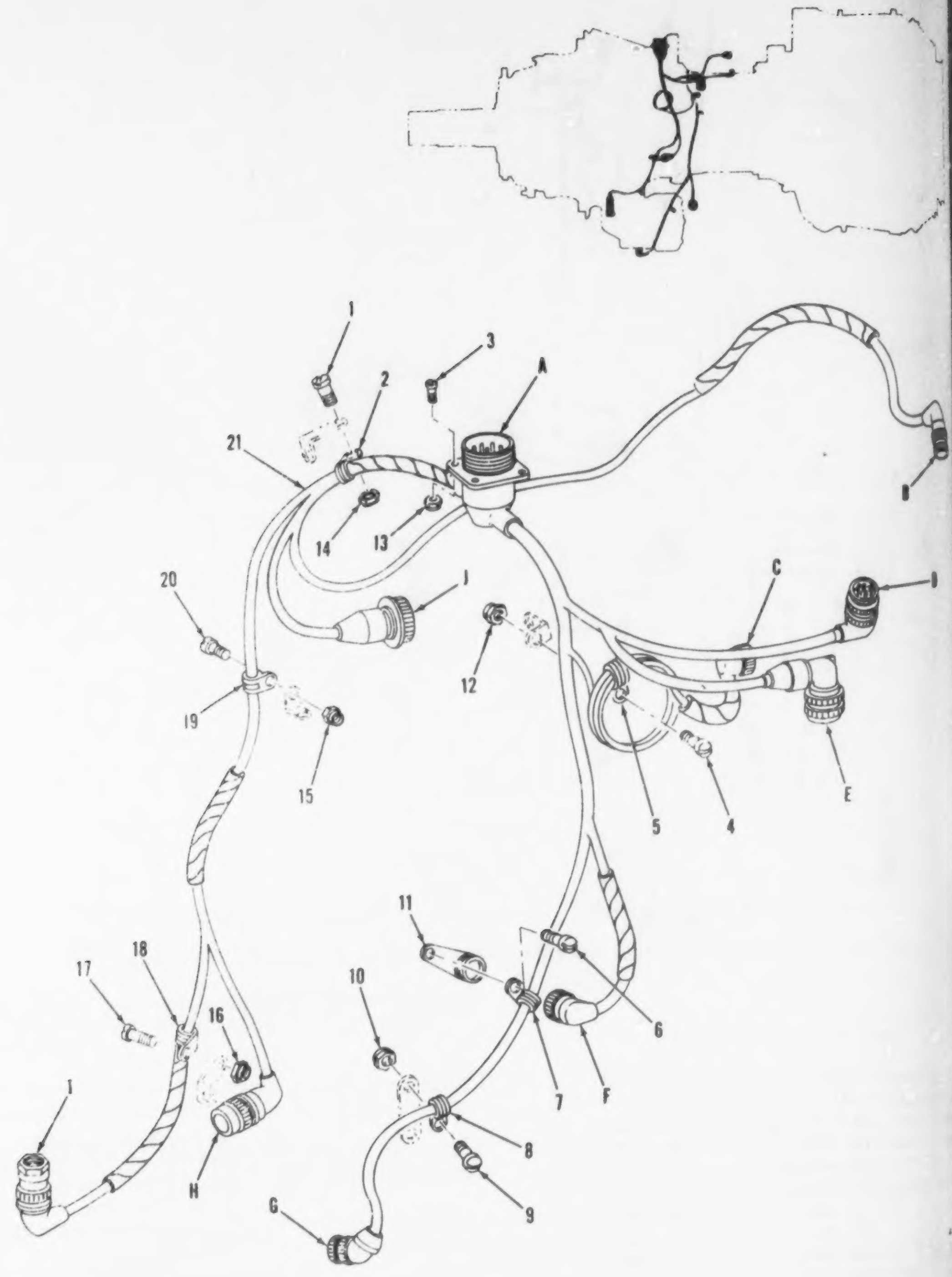
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Figure 5-64. Electrical Cable Assembly and Attaching Parts (T53-L-15)

Key to Figure 5-64.

rew
amp
rew
rew
amp
rew
amp
amp
rew

10. Nut
11. Bracket
12. Nut
13. Nut
14. Nut
15. Nut
16. Nut
17. Screw
18. Clamp

19. Clamp
20. Screw
21. Electrical Cable Assembly
A. Airframe Main Connector
B. Ignition Unit Input Connector
C. Starting Fuel Solenoid Valve Connector
D. Fuel Filter Pressure Switch Connector

E. Power Turbine (N2) Tachometer Generator Connector
F. Not Used
G. Oil Temperature Bulb Connector
H. Compressor Rotor (N1) Tachometer Generator Connector
I. Chip Detector Connector
J. Hot-Air Solenoid Valve Connector

NOTE

Prior to installation of cable assembly (21), ensure that chafing sleeves are positioned where cable may come in contact with inlet guide vane actuator.

Ensure that cable assembly 1-300-196-03 or cable assembly 1-300-196-04 has had revision M accomplished. Cable assembly has been lengthened to measure 33 inches between the centerlines of main connector, MS33678 R22-14P, and chip detector connector, MS33679R8S-1S.

Position electrical cable assembly (21) on en- that six connectors (G, F, C, D, E, and B) are -hand side and three connectors (J, H, and I) right-hand side of engine.

Secure airframe main connector (A) to engine t with screws (3) and nuts (13). Tighten screws ired.

NOTE

Connector (F) is not used.

Attach electrical cable assembly to components ch of following connectors: oil temperature), starting fuel solenoid valve (C), fuel filter e switch (D), power turbine (N2) tachometer tor (E), hot-air solenoid valve (J), compressor 1) tachometer generator (H), chip detector ignition unit input (B). Tighten all connectors ired and lockwire.

osition clamps (2, 5, 7, 8, 18, and 19) and se- ctrical cable assembly to engine with screws as necessary. Tighten screws as required wire.

onnect electrical plug at airframe main con-

REMOVAL OF ELECTRICAL CABLE ASSEM- 3-L-701 Engine). (See figure 5-65.) Proceed ws:

emove all screws and nuts that secure elec- ble assembly clamps (2, 5, 7, 8, 18, and 19) e.

NOTE

Tag each connector to facilitate reassembly.

b. Disconnect electrical plug at airframe main connector (A).

NOTE

Connector (F) is not used.

c. Disconnect electrical cable assembly (21) at each of the following connectors: oil temperature bulb (G), starting fuel solenoid valve (C), fuel filter pressure switch (D), power turbine (N2) tachometer generator (E), electrical torquemeter (K), hot-air solenoid valve (J), compressor rotor (N1) tachometer generator (H), chip detector (I), and ignition unit input (B).

d. Remove screws (3) and nuts (13) that secure airframe main connector (A) to bracket.

e. Remove electrical cable assembly from engine.

5-126. INSTALLATION OF ELECTRICAL CABLE ASSEMBLY (T53-L-701 Engine). (See figure 5-65.) Proceed as follows:

NOTE

Prior to installation of electrical cable assembly (21), ensure that chafing sleeves are installed and positioned as shown in figure 5-65 to prevent chafing on engine components.

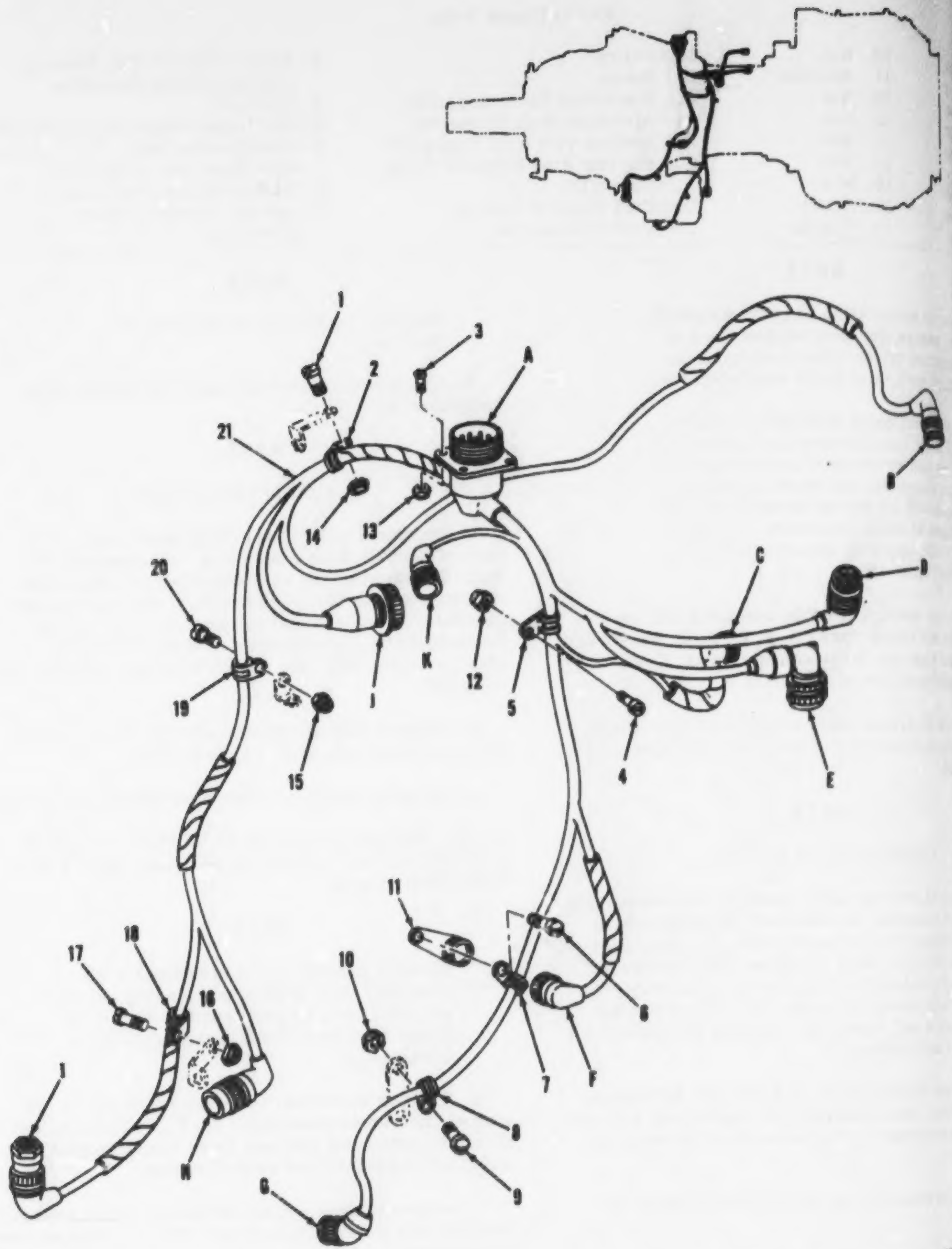
a. Position electrical cable assembly (21) on engine so that seven connectors (G, F, C, D, E, K, and B) are on left-hand side and three connectors (J, H, and I) are on right-hand side of engine.

b. Secure airframe main connector (A) to engine bracket with screws (3) and nuts (13). Tighten screws as required.

NOTE

Connector (F) is not used.

c. Attach electrical cable assembly to components with each of the following connectors: oil temperature bulb (G), starting fuel solenoid valve (C), fuel filter pressure switch (D), power turbine (N2)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16
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I
7
F
H
8
G
9

Figure 5-65. Electrical Cable Assembly and Attaching Parts (T53-L-701)

Key to Figure 5-65.

Screw
Clamp
Screw
Screw
Clamp
Screw
Clamp
Clamp
Screw
Nut
11. Bracket
12. Nut
13. Nut
14. Nut
15. Nut
16. Nut
17. Screw
18. Clamp
19. Clamp
20. Screw
21. Electrical Cable Assembly
A. Airframe Main Connector
B. Ignition Unit Input Connector
C. Starting Fuel Solenoid Valve Connector
D. Fuel Filter Pressure Switch Connector
E. Power Turbine (N2) Tachometer Generator Connector
F. Not Used
G. Oil Temperature Bulb Connector
H. Compressor Rotor (N1) Tachometer Generator Connector
I. Chip Detector Connector
J. Hot-Air Solenoid Valve Connector
K. Electric Torquemeter Connector

---

ometer generator (E), electrical torquemeter (K), hot-air oid valve (J), compressor rotor (N1) tachometer generator chip detector (I), and ignition unit input (B). Tighten all ectors as required and lockwire.

d. Position clamps (2, 5, 7, 8, 18, and 19) and secure elec- l cable assembly to engine with screws and nuts as neces- Tighten screws as required and lockwire.

e. Connect electrical plug at airframe main connector.

. REMOVAL OF ELECTRICAL TORQUEMETER CTION BOX ASSEMBLY.

(T53-L-701 Engine). (See fig- -66.) Proceed as follows:

CAUTION

Removal of the torque meter junction box is allowed only for trouble shooting purposes and to gain access to other components. Field replacement is not authorized. Under no circumstances should the junction box cover be removed. Adjustment or replacement of the junction box is to be performed only as outlined in Chapter 10.

a. Cut lockwire and remove four screws (1) and four wash-) from overspeed governor mounting flange.

b. Remove electrical torquemeter junction box (3).

c. Disconnect electric cabling at connector (4).

5-128. INSTALLATION OF ELECTRICAL TORQUEMETER JUNCTION BOX ASSEMBLY

T53-L-701 Engine. (See figure 5-66.) Proceed as follows:

a. Connect electrical cabling at connector (4).

b. Mount junction box (3) on flange of overspeed governor and secure with four screws (1) and four washers (2). Lockwire screws.

5-128A. ADJUSTMENT OF ELECTRIC TORQUEMETER SYSTEM.

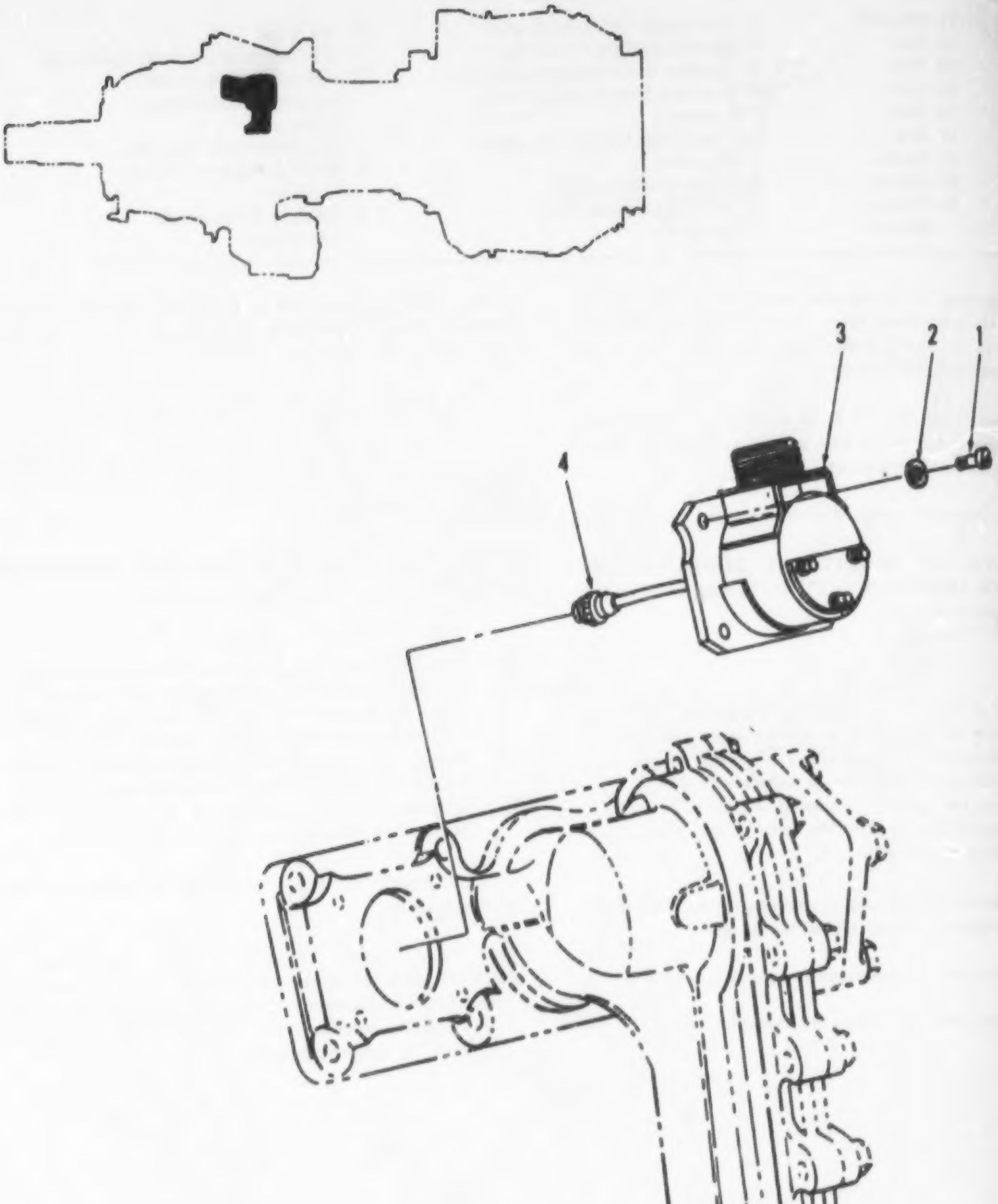
(T53-L-701). Proceed as follows:

NOTE

The engine sun gearshaft, torquemeter head assembly, and torquemeter junction box are replaced at Depot level only. Whenever a power supply, cockpit indicator, or aircraft wiring is replaced, the relative cockpit indicator pointer must be adjusted to align with the zero mark. This is accomplished by the use of special purpose (shorting) cable (LTCT13476) or equivalent. (See wiring diagram, figure 5-66A).

a. Adjust the pointed to "O" on the desired engine indicator as follows:

(1) Install special purpose (shorting) cable (LTCT13476) between the torquemeter junction box plug and engine electrical harness junction box connector. This separates the torquemeter junction box and head assembly wiring from the aircraft wiring and components.



1. Screw
2. Washer
3. Junction Box
4. Connector

Figure 5-66. Electrical Torquemeter Junction Box Assembly and Attaching Parts (T53-L-701)

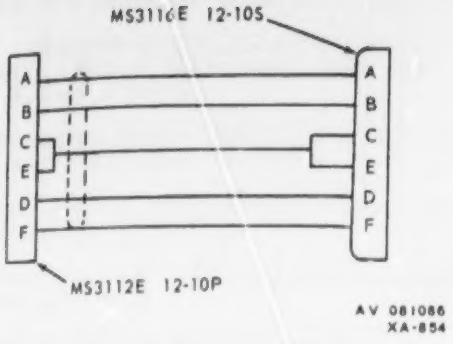


Figure 5-66A. Wiring Diagram for Special Purpose Cable (LTCT13476)

NOTE

Zeroing of the indicator may also be accomplished during flight line operational check of system using electric torquemeter comparator test set (LTCT13608). (Refer to following step b.)

(2) Close cockpit 115 vac, 28 vdc, power sup- battery relay, indicator circuit breakers, and ry switch to Normal.

(3) Adjust resistor R1 on the rear of the de- engine indicator to align the pointer to "O".

(4) Repeat the above procedure for the other e indicator, as required.

NOTE

The only time indicator pointers must read "O" is when the special purpose cable is installed. The quantitative signal of the engine torquemeter portion of the system is not defined below 13 psi torque. The pointers will stop at any increment below 13 psi on the indicators with the engine not operating.

Perform flight line operational check of torque- system using electric torquemeter comparator et (LTCT13608).

5-129. REMOVAL OF IGNITION LEAD AND COIL ASSEMBLY (T53-L-7/7A Engines).

(See figure 5-67.) Proceed as follows:

WARNING

Ensure that all electrical power is disconnected.

NOTE

Unless ignition unit is to be removed at this time, reinstall screw that secures ignition lead and coil clamp to ignition unit loop clamp.

a. Remove nuts (2) and screws (1 and 4) that secure clamps (3 or 9).

b. Disconnect ignition lead and coil assembly (6) from igniter plugs (5) and from ignition unit (8).

NOTE

The spark splitter coil, bracket, and three electrical leads are removed as a unit.

c. Remove bolts (7) that secure coil assembly to diffuser housing. Remove ignition lead and coil assembly (6).

5-130. INSTALLATION OF IGNITION LEAD AND COIL ASSEMBLY (T53-L-7/7A Engines).

(See figure 5-67.) Proceed as follows:

NOTE

The spark splitter coil, bracket, and three electrical leads are installed as a unit.

WARNING

Ensure that all electrical power is disconnected.

a. Position bracket, with coil and igniter leads, on bosses on lower left rear engine mount. Secure with bolts (7). Lockwire.

b. Connect electrical leads from spark splitter coil to igniter plugs (5). Using socket adapter (LTCT 4457) tighten connection to 40 to 50 pound-inches torque.

nect connector from ignition lead and coil (6) to ignition unit (8) and igniter plugs (5).

REMOVAL OF IGNITION LEAD AND COIL LY (T53-L-15/701 Engines). (See figure roceed as follows:

connect electrical leads at igniter plugs (12, nd 32) and ignition unit (42).

move screws that secure all clamps on igni- and coil assembly (36).

move bolts (38) that secure ignition lead and mbly to engine.

move ignition lead and coil assembly from

NOTE

ther disassembly is not required un- the ignition lead and coil assembly eing replaced.

ove bolts (37) and nuts (34) that secure ig- d and coil assembly (36) to bracket (35). gnition lead and coil assembly from brack-

NSTALLATION OF IGNITION LEAD AND EMBLY (T53-L-15/701 Engines). (See .) Proceed as follows:

nition lead and coil assembly (36) and brack- e separated, secure bracket to ignition lead sembly with bolts (37) and nuts (34).

tion ignition lead and coil assembly on en- cure with bolts (38). Lockwire bolts.

ect two short leads to ignition unit (42). nectors as required and lockwire. Con- n leads to igniter plugs (12, 19, 27, and en to 40 to 50 pound-inches torque.

e ignition lead and coil assembly clamps ith screws and nuts.

MOVAL OF IGNITION UNIT (T53-L-7/7A (See figure 5-69.) Proceed as follows:

WARNING

e that all electrical power is dis- cted.

The ignition unit contains a very small amount of radioactive material (Cesium-Barium 137) and normally requires no handling precautions. However, severely damaged units that have broken open, must be handled with forceps or gloves and disposed of in accordance with AR 755-15 and TB 55-1500-314-25.

a. Disconnect electrical connectors (1 and 5) from ignition unit (4).

NOTE

Loop clamps are secured to bracket (8) on rear flange of impeller housing. Bracket is secured by three bolts (6) that secure impeller housing to diffuser housing and by fourth bolt (9) and spacer (7) through bracket base.

b. Remove screws (2) and nuts (3) that secure end of clamps (10) holding the ignition unit. Spread loop clamps until slots in clamps clear positioning lugs on both sides of ignition unit ends. Slide clamps toward each other to release ignition unit for removal.

5-134. INSTALLATION OF IGNITION UNIT (T53-L-7/7A Engines). (See figure 5-69.) Proceed as follows.

WARNING

Make certain that all electrical power is disconnected.

a. Place ignition unit (4) on bracket (8). Position clamps (10) around unit so that lugs on the unit fit into slots in loop clamps. Secure clamp ends with screws (2) and nuts (3). Lockwire screws.

b. Connect connector (1). Lockwire.

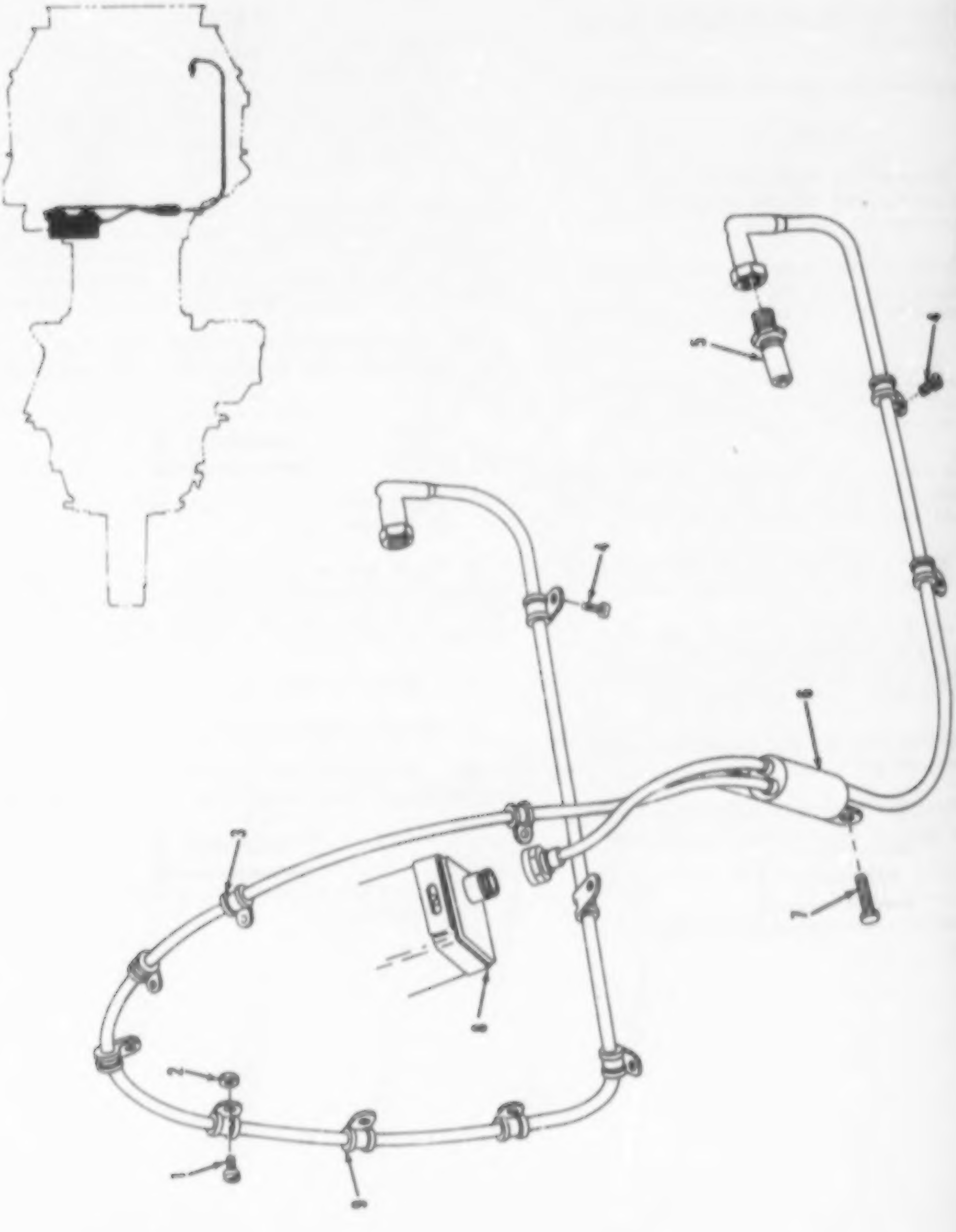
c. Connect connector (5) from spark splitter coil.

5-135. REMOVAL OF IGNITION UNIT (T53-L-15/701 Engines). (See figure 5-68.) Proceed as follows:

WARNING

Ensure that all electrical power is disconnected.

1. Screw (Typical)
2. Nut (Typical)
3. Clamp (Typical)
4. Screw
5. Igniter Plug
6. Ignition Lead and Coil Assembly
7. Bolt
8. Ignition Unit
9. Clamp



Disconnect electrical connectors from ignition
2).

Remove screws (45) and nuts (44) that secure
f loop clamps (43). Spread loop clamps until
n clamps clear positioning lugs on both sides
tion unit. Slide clamps toward each other.
eleases ignition unit for removal.

f bracket (40) must be removed, remove bolts
41) and remove bracket from compressor
assembly.

INSTALLATION OF IGNITION UNIT (T53-L-
Engines). (See figure 5-68.) Proceed as
:

removed, position bracket (40) on compressor
and secure with bolts (39 and 41). Tighten
required and lockwire.

lace ignition unit (42) on bracket. Position
mps (43) around unit so that lugs on unit fit
ts in loop clamps. Secure loop clamps with
(45) and nuts (44). Tighten screws as re-
nd lockwire.

nnect all electrical connectors to ignition
ighten connectors as required and lockwire.

REMOVAL OF IGNITER PLUGS (T53-L-7/
es). (See figure 5-67.) Proceed as follows:

WARNING

ke certain all electrical power is dis-
nected.

ing socket adapter (LTCT4457) disconnect
leads from igniter plugs (5).

move igniter plugs from fire shield.

INSTALLATION OF IGNITER PLUGS (T53-
ngines). (See figure 5-67.) Proceed as

WARNING

ure that all electrical power is dis-
nected.

all igniter plugs (5) in fire shield at approxi-
and 7-o'clock positions by hand. If plugs
tom, repair threads by using 7/16-28 NEF
. Reinstall plugs and tighten as required.
table 11-3, reference number 83.) Lock-

b. (Deleted)

c. (Deleted)

d. (Deleted)

e. Using socket adapter (LTCT4457), connect electrical leads from spark splitter coil to igniter plugs and tighten as required. (Refer to table 11-3, reference number 82.)

5-139. REMOVAL OF IGNITER PLUGS (T53-L-15/701 Engines). (See figure 5-68.) Proceed as follows:

WARNING

Make certain all electrical power is disconnected.

a. Disconnect ignition leads from igniter plugs (12, 19, 27, and 32).

b. Remove igniter plugs from igniter mounts and remove spacers (11, 18, 28, and 33) from igniter plugs.

5-140. INSTALLATION OF IGNITER PLUGS (T53-L-15/701 Engines). (See figure 5-68.) Proceed as follows:

a. Position spacers (11, 18, 28, and 33), with shouldered end toward engine, on igniter plugs (12, 19, 27, and 32).

NOTE

In following step b., if plugs cannot be tightened by hand, inspect threads for damage, or adjust plate in combustion chamber liner to gain clearance.

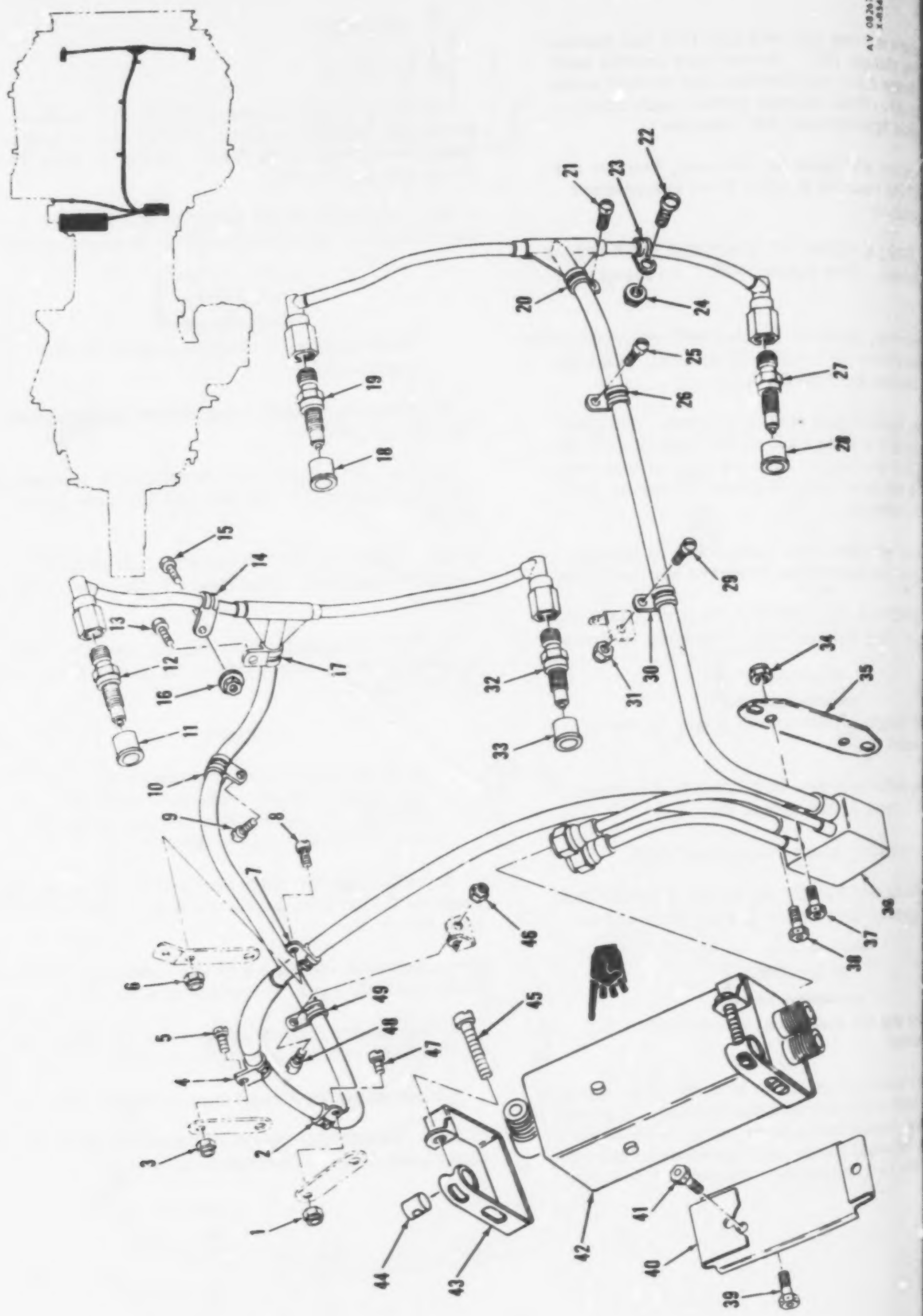
b. Install igniter plugs into mounts by hand. If plugs do not bottom, repair threads by using 7/16-28 NEF tap or die.

c. Reinstall igniter plugs and tighten as required. (Refer to table 11-3, reference number 88.)

d. Reconnect ignition leads to igniter plugs and tighten to 40 to 50 pound-inches torque.

e. Reconnect electrical lead to igniter unit.

5-141. REMOVAL OF OIL TEMPERATURE BULB. (See figure 5-53.) Proceed as follows: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Key to Figure 5-68.

Nut
Clamp
Nut
Clamp
Screw
Nut
Clamp
Screw
Screw
Clamp

11. Spacer
12. Igniter Plug
13. Screw
14. Clamp
15. Screw
16. Nut
17. Clamp
18. Spacer
19. Igniter Plug
20. Clamp

21. Screw
22. Screw
23. Clamp
24. Nut
25. Screw
26. Clamp
27. Igniter Plug
28. Spacer
29. Screw
30. Clamp

31. Nut
32. Igniter Plug
33. Spacer
34. Nut
35. Bracket
36. Ignition Lead and Coil Assembly
37. Bolt
38. Bolt
39. Bolt

40. Bracket
41. Bolt
42. Ignition Unit
43. Loop Clamp
44. Nut
45. Screw
46. Nut
47. Screw
48. Screw
49. Clamp

. Remove electrical connector (1) from oil tem-
ture-sensing bulb (2).

. Unscrew oil temperature-sensing bulb and re-
e bulb and packing (3) from power-driven rotary
pump (5).

2. INSTALLATION OF OIL TEMPERATURE
B. (See figure 5-53.) Proceed as follows:

Install oil temperature-sensing bulb (2) and
ing (3) in power-driven rotary (oil) pump (5).

CAUTION

Do not twist electrical connector during installation.

Connect electrical connector (1).

If keyway in connector does not align with key
l temperature bulb, replace bulb. Repeat re-
ment until key and keyway align.

If key and keyway do not align after several
ent bulbs have been tried, proceed as follows:

CAUTION

The oil temperature-sensing bulb connector (figure 5-70) incorporates an elbow with a knurled nut (shell) retained at one end by a shoulder and a receptacle with a knurled nut (shell) similarly retained. Internal wiring extends from a rubber grommet inside elbow to two pin sleeves installed in receptacle. Breakage of wires during repositioning can occur at point between grommet and pin sleeves.

(1) Hold elbow and receptacle in alignment and
knurled shell on elbow until internal wiring
n elbow and receptacle is exposed.

CAUTION

To prevent damage to wiring, do not rotate receptacle unless grommet in elbow is free
o turn.

2) Determine amount of slack in internal wiring
ly rotating receptacle in both directions.

(3) Install the oil temperature bulb that offers best alignment with rotated receptacle.

(4) Install receptacle on bulb and tighten both shells. Lockwire shells and elbow.

5-143. REMOVAL OF HOT-AIR SOLENOID VALVE AND AIR REGULATOR TUBE. (See figure 5-71.) Proceed as follows:

a. Disconnect connector (7) from solenoid on hot-air solenoid valve (2).

b. Remove two bolts (8).

c. Open retaining ring (5). Push ring rearward on anti-icing air regulator tube (4).

d. Disconnect anti-icing air regulator tube (4) by twisting and sliding forward into inlet housing. Lift off valve. Remove gasket (1) and packings (3 and 6). Remove tube from inlet housing.

5-144. INSTALLATION OF HOT-AIR SOLENOID VALVE AND AIR REGULATOR TUBE. (See figure 5-71.) Proceed as follows:

a. Slide retaining ring (5) on air regulator tube (4).

b. Place packing (6) in recessed area within inlet housing.

c. Insert tube into inlet housing and, using turning motion, push it into inlet housing to allow hot-air solenoid valve (2) to clear tube.

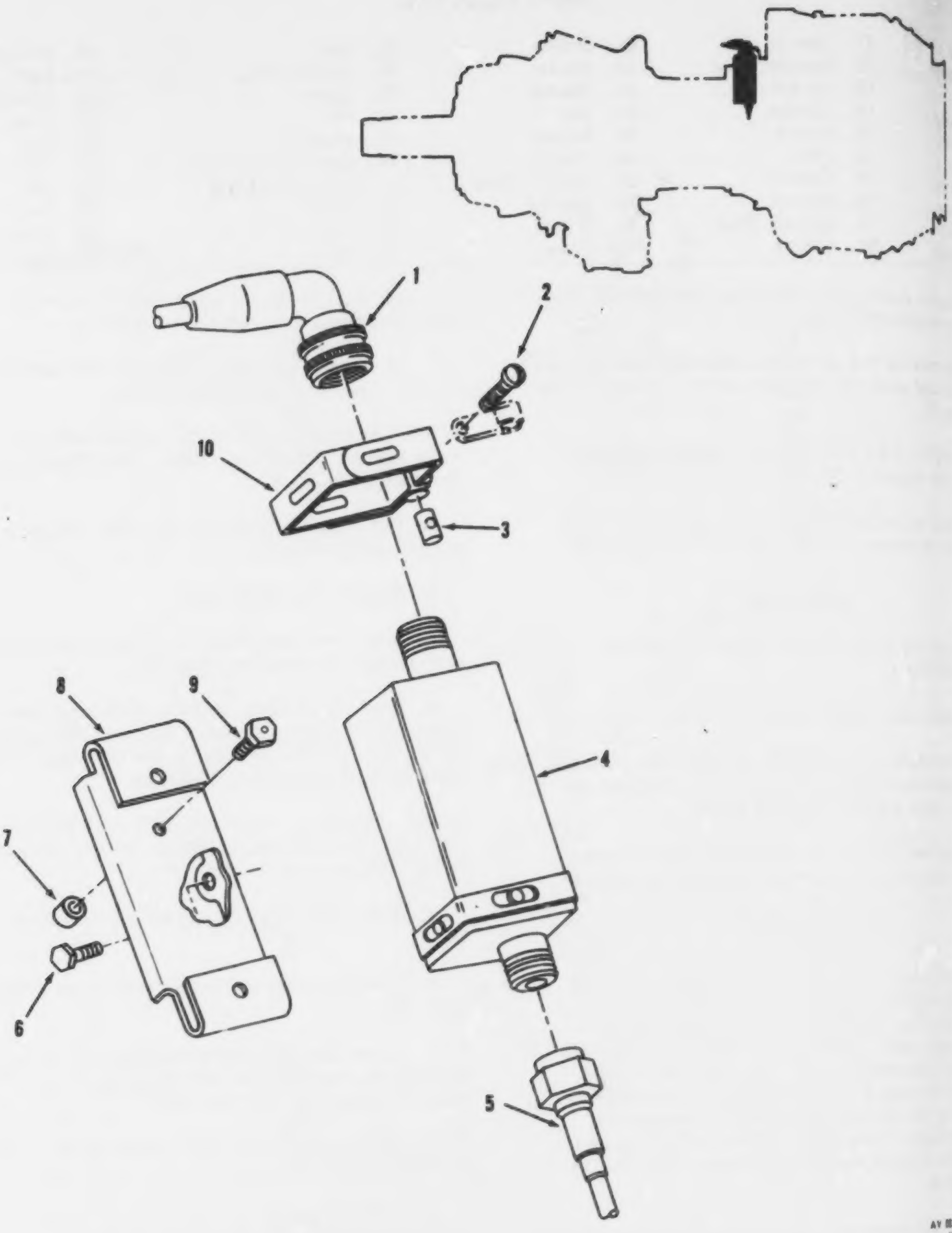
d. Place packing (3) in recessed area of hot-air solenoid valve (2).

e. Position gasket (1) and hot-air solenoid valve (2) on impeller housing with bolts (8).

f. Slide tube rearward into valve and install retaining ring (5) firmly against inlet housing.

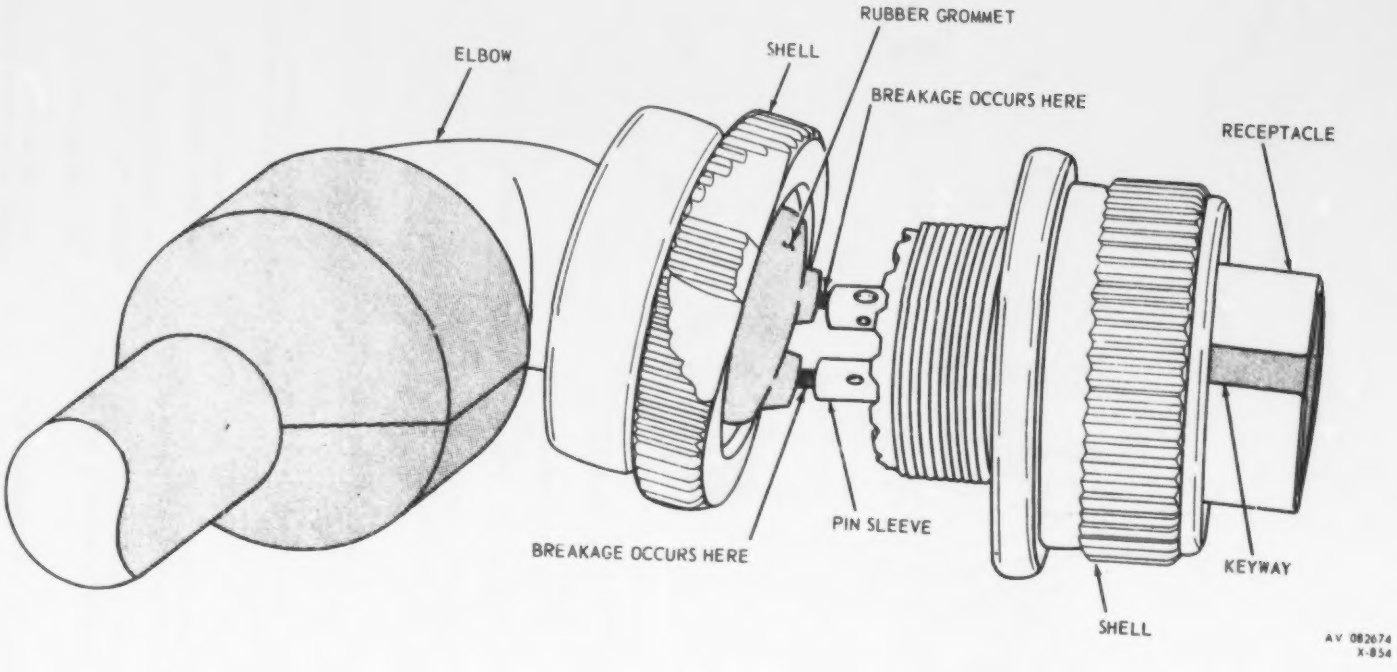
g. Tighten bolts (8) to standard torque and lockwire.

h. Attach connector (7) from electrical cable assembly on valve connector. Tighten as required and lockwire.



1. Connector
2. Screw
3. Nut
4. Ignition Unit
5. Connector
6. Bolt
7. Spacer
8. Bracket
9. Bolt
10. Clamp

Figure 5-69. Ignition Unit and Attaching Parts (T53-L-7/7A)


ELBOW
SHELL
RUBBER GROMMET
BREAKAGE OCCURS HERE
RECEPTACLE
BREAKAGE OCCURS HERE
PIN SLEEVE
KEYWAY
SHELL
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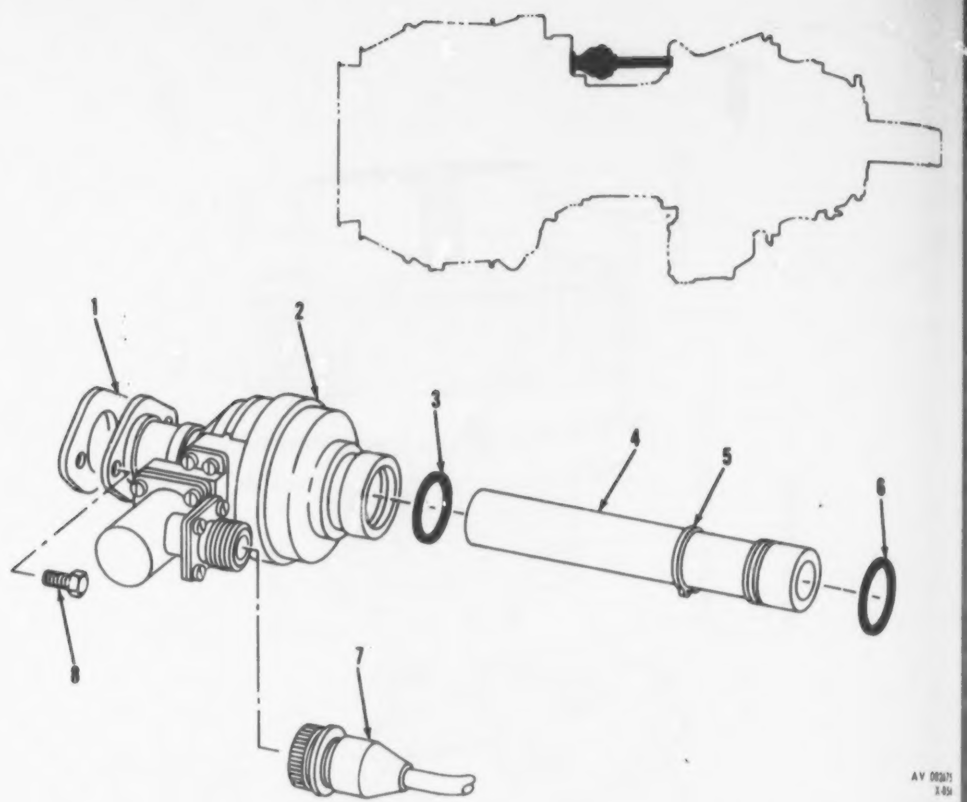
X-854

Figure 5-70. Repositioning Oil Temperature-Sensing Bulb Connector



1. Gasket
2. Hot-Air Solenoid Valve
3. Packing
4. Anti-Icing Air Regulator Tube
5. Retaining Ring
6. Packing
7. Connector
8. Bolt

Figure 5-71. Hot-Air Solenoid Valve and Attaching Parts

5-145. REMOVAL OF AIRBLEED CONNECTING MANIFOLD AND ADAPTER ASSEMBLY (T53-L-7/7A Engines).

(See figure 5-72.) Proceed as follows:

a. Remove bolts (12) that secure airbleed connecting manifold (11) to diffuser housing.

b. Remove bolts (1) that secure airbleed connecting manifold to adapter assembly (9). Remove gasket (2), and airbleed connecting manifold (11).

c. Remove bolts (6) that secure cover (7) to adapter assembly. Remove gasket (8) and cover (7).

d. Remove bolts (4) that secure adapter assembly to impeller housing. Remove brackets (3 and 5) and gasket (10).

e. Remove airbleed connecting manifold and adapter assembly.

5-146. INSTALLATION OF AIRBLEED CONNECTING MANIFOLD AND ADAPTER ASSEMBLY (T53-L-7/7A Engines).

(See figure 5-72.) Proceed as follows:

a. Position gasket (10) on impeller housing, cure adapter assembly (9) and gasket with bolts and brackets (3 and 5).

b. Install gasket (8) on cover (7) on adapter sembly and secure with bolts (6).

c. Position gasket (2) on rectangular end bleed connecting manifold (11).

d. Secure airbleed connecting manifold and to adapter assembly with bolts (1).

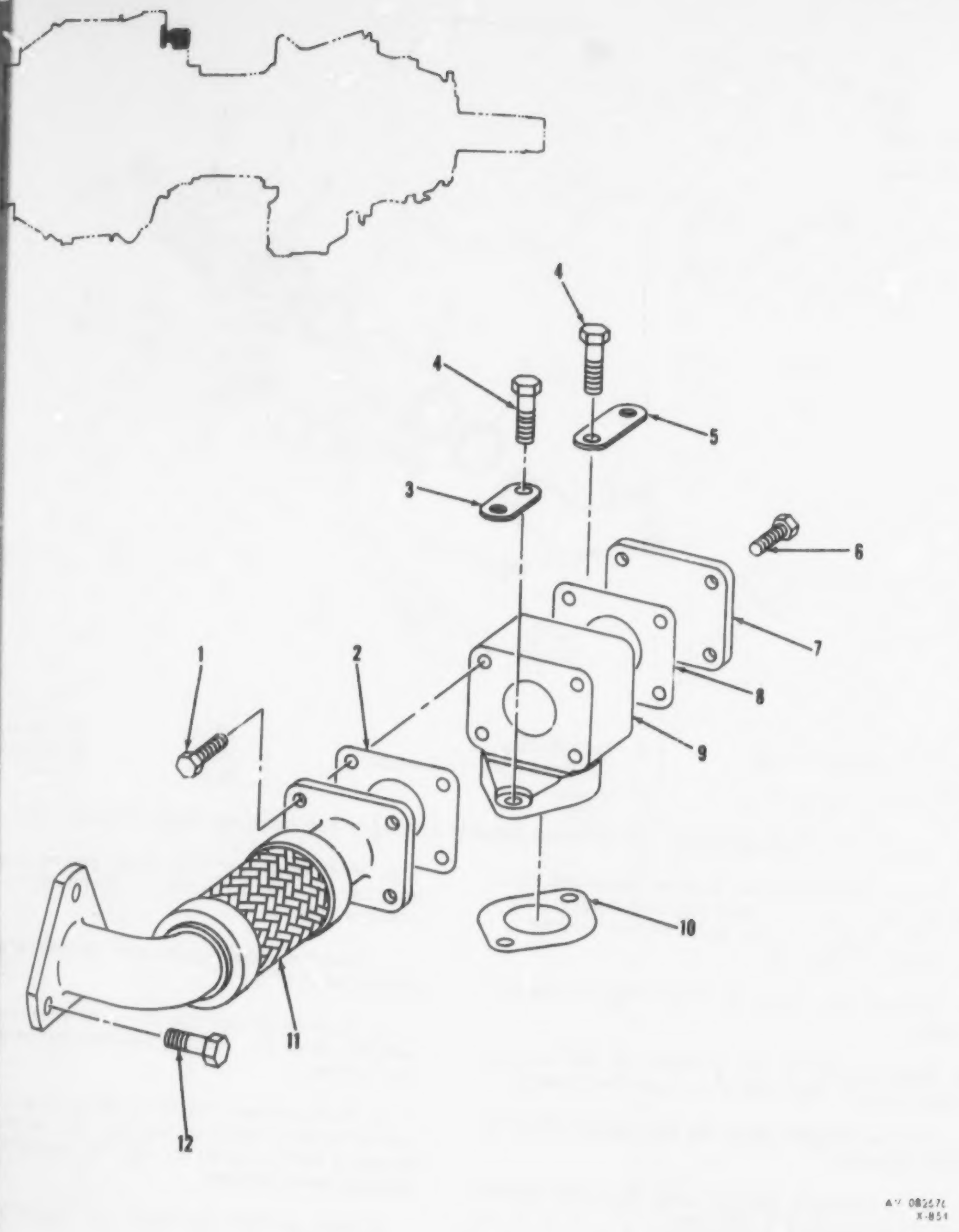
e. Secure airbleed connecting manifold to housing with bolts (12).

f. Tighten and lockwire bolts.

5-147. REMOVAL OF ELBOW, TUBE, AND BLEED ADAPTER ASSEMBLY (T53-L-15/

gines). (See figure 5-73.) Proceed as follow

a. Remove bolts (12) that secure airbleed elbow (1) to diffuser housing.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11
12
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X-854

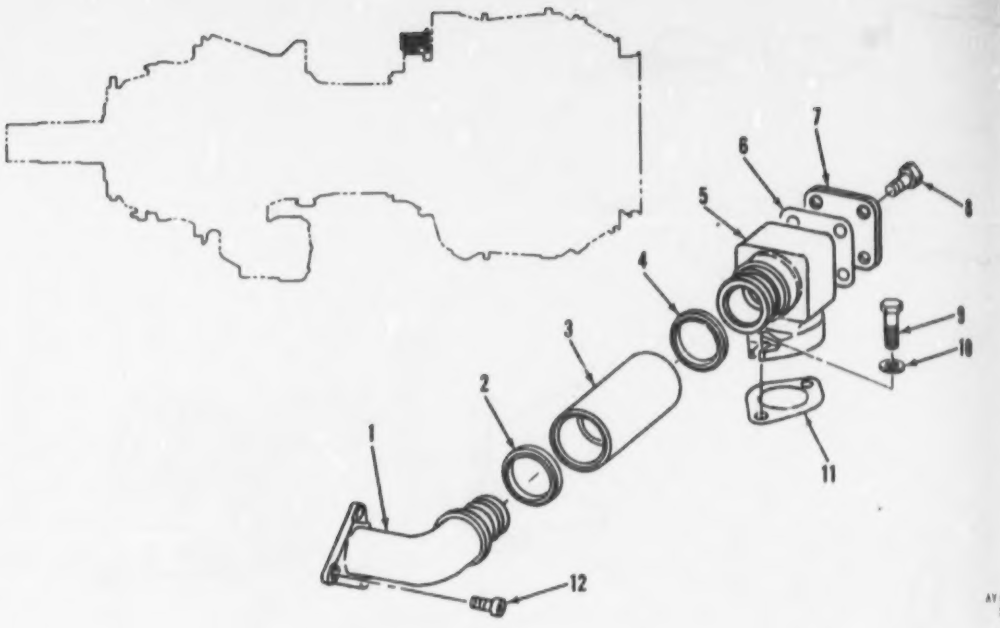
Bolt
Gasket
Bracket

4. Bolt
5. Bracket
6. Bolt

7. Cover
8. Gasket
9. Adapter Assembly

10. Gasket
11. Airbleed Connecting Manifold
12. Bolt

Figure 5-72. Airbleed Connecting Manifold, Adapter Assembly, and Attaching Parts (T53-L-7/7A)



1. Airbleed Adapter Elbow
2. Gasket Ring
3. Airbleed Crossover Tube
4. Gasket Ring
5. Airbleed Adapter Assembly
6. Gasket
7. Cover
8. Bolt
9. Bolt
10. Washe
11. Gask
12. Bolt

Figure 5-73. Elbow, Tube, and Airbleed Adapter Assembly and Attaching Parts (T53-L-15/701)

b. Using twisting motion, remove elbow and airbleed crossover tube (3) from airbleed adapter assembly (5). Separate elbow and tube and remove gasket ring (2) from elbow.

c. Remove gasket ring (4) from flange of adapter assembly.

d. Remove bolts (9) and washers (10) that secure airbleed adapter assembly (5) to impeller housing.

e. Remove adapter assembly and gasket (11) from impeller housing.

f. When required, remove bolts (8), cover (7), and gasket (6) from adapter assembly.

5-148. INSTALLATION OF ELBOW, TUBE, AND AIRBLEED ADAPTER ASSEMBLY (T53-L-15/701 Engines). (See figure 5-73.) Proceed as follows:

a. Position gasket (6) and cover (7) on airbleed adapter assembly (5) and secure with bolts (8).

NOTE

Position flanged port toward right side of engine.

b. Position gasket (11) and adapter assem impeller housing and secure with bolts (9) a washers (10).

c. Position gasket ring (4) on flanged port adapter assembly.

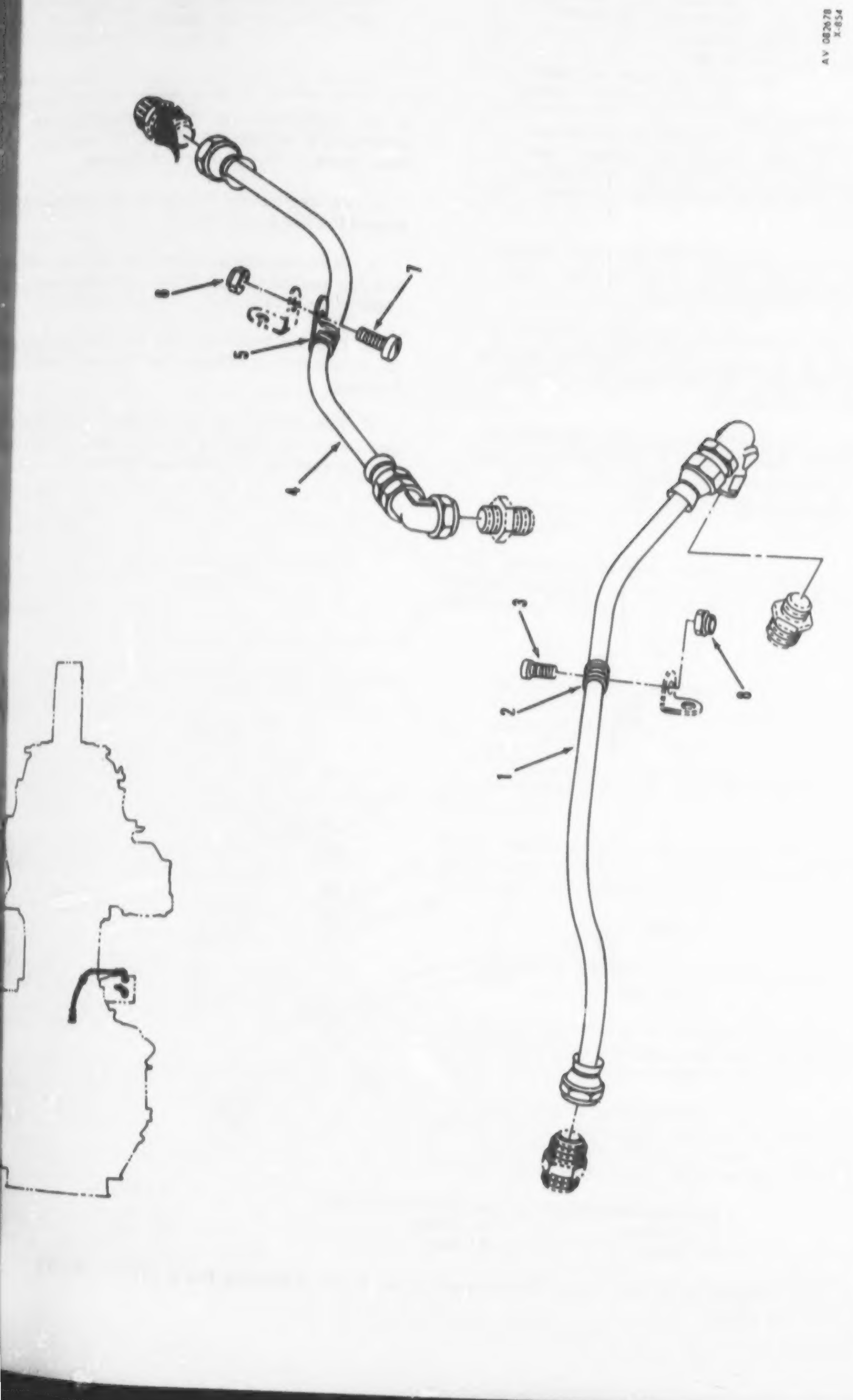
d. Position gasket ring (2) on flange of air adapter elbow (1). Slide airbleed crossover t over elbow.

e. Slide airbleed crossover tube (3) over port of airbleed adapter assembly (5) and po flange of airbleed adapter elbow (1) against housing mounting port.

f. Secure elbow with bolts (12). Tighten standard torque and lockwire.

5-149. REMOVAL OF INTERSTAGE BLEED TOR HOSES (T53-L-7/7A Engines). (See fi 5-74.) Proceed as follows:

a. Remove screw (3) and nut (8) that sec (2) to bracket. Disconnect airbleed hose as (actuator to diffuser) (1) from union in diffu ing and from reducer in airbleed actuator. hose. Cap all open ports.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4
5
7

Figure 5-74. Interstage Bleed Actuator Hoses and Attaching Parts (T53-L-7/7A)

Key to Figure 5-74.

1. Airbleed Hose Assembly (Actuator to Diffuser)
2. Clamp
3. Screw
4. Airbleed Hose Assembly (Actuator to Fuel Control)
5. Clamp
6. Nut
7. Screw
8. Nut

---

b. Remove screw (7) and nut (6) that secure clamp (5) to bracket. Disconnect airbleed hose assembly (actuator to fuel control) (4) from airbleed actuator and from union in fuel control. Cap all open ports.

5-150. INSTALLATION OF INTERSTAGE BLEED ACTUATOR HOSES (T53-L-7/7A Engines). (See figure 5-74.) Proceed as follows:

a. Connect airbleed hose assembly (actuator to fuel control) (4) to union in fuel control and to union in airbleed actuator. Secure clamp (5) to bracket with screw (7) and nut (6).

b. Connect airbleed hose assembly (actuator to diffuser) (1) to union in diffuser housing and to reducer in airbleed actuator. Secure clamp (2) to bracket with screw (3) and nut (8).

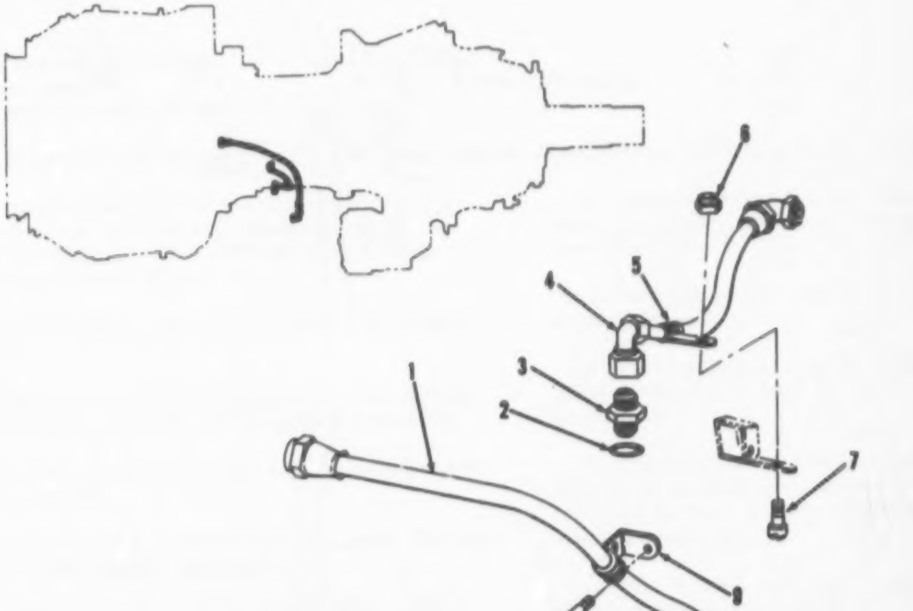
5-151. REMOVAL OF INTERSTAGE BLEED ACTUATOR HOSES (T53-L-15/701 Engines). (See figure 5-75.) Proceed as follows:

a. Remove screw (8) that secures clam actuator housing assembly.

b. Disconnect hose assembly (1) from housing and interstage bleed actuator assem remove hose assembly. Cap all open ports.

c. Remove screw (7) and nut (6) that secu (5) to bracket on bottom rear flange of comp housing.

d. Disconnect hose assembly (4) from and interstage bleed actuator assembly and hose assembly. Cap all open ports.



1. Hose Assembly
2. Packing
3. Union
4. Hose Assembly
5. Clamp
6. Nut
7. Screw
8. Screw
9. Clamp

Figure 5-75. Interstage Bleed Actuator Hoses and Attaching Parts (T53-L-15/701)

Remove union (3) and packing (2) from actuator bly.

INSTALLATION OF INTERSTAGE BLEED ATOR HOSES (T53-L-15/701 Engines). (See 5-75.) Proceed as follows:

nstall union (3) and packing (2) into actuator bly and tighten as required.

NOTE

Prior to installing hose assembly (4), nsure that chafing sleeve is installed nd positioned to prevent rubbing against earby hoses and other components. Refer to paragraph 7-32.)

onnect hose assembly (4) to fuel control and ge bleed actuator assembly. Tighten hose ors as required. (Refer to table 11-3, refer-mber 100.)

ecure clamp (5) to bracket on bottom rear f compressor housing with screw (7) and nut

onnect hose assembly (1) to diffuser housing rstage bleed actuator assembly. Tighten hose ors as required. (Refer to table 11-3, refer-mber 108.)

ecure clamp (9, figure 5-75) to interstage ctuator assembly with screw (8).

hrough 5-157. (Deleted)

Figures 5-76 through 5-80 deleted.

REMOVAL OF INTERSTAGE BLEED TOR ASSEMBLY AND BLEED BANDS. (See -81.) Proceed as follows:

isconnect hose assembly from diffuser and fuel control at actuator assembly. Cap and identify hose assemblies. Remove screw ures hose clamp to actuator housing.

move screw and nut that secure lubrication embly clamps to actuator assembly.

move bolts (12 and 16) and washers (13 and

ll interstage bleed actuator assembly (17) m compressor housing to expose connections rod end (4) and upper band (6), and piston lower band (9).

pport actuator assembly and remove pins (11) re actuator assembly to bands. Remove

move bushings (19 and 20).

NOTE

ercise care in removing bands to vent twisting or bending. If bands are separated, mark the upper and lower bands for identification.

g. Hold screw (10) and remove nut (8) and washer (7) that secure upper and lower bands (6 and 9). Remove screw (10). Slide bands through clips (5) and remove bands.

h. For minor servicing of interstage bleed actuator assembly, refer to paragraph 5-158A.

5-158A. MINOR SERVICING OF INTERSTAGE BLEED ACTUATOR ASSEMBLY. (See figure 5-81A.) Proceed as follows:

NOTE

In following step a., ensure that strainer and spring are not inadvertently released when the reducer is removed.

a. Remove sediment strainer (2) by removing reducer (4) and packing (3). Remove strainer and spring (1).

b. Clean parts with drycleaning solvent (item 28, table 2-2).

c. Inspect parts for physical damage. Replace damaged parts.

d. Position sediment strainer (2, figure 5-81A) on tapered end of spring (1). Insert spring and strainer into actuator assembly.

NOTE

In following step e., ensure that spring and strainer are seated properly before tightening reducer.

e. Coat packing (3) with grease (item 53, table 2-2), then install packing on reducer (4, figure 5-81A). Install reducer.

5-159. INSTALLATION OF INTERSTAGE BLEED ACTUATOR ASSEMBLY AND BLEED BANDS. (See figure 5-81.) Proceed as follows:

NOTE

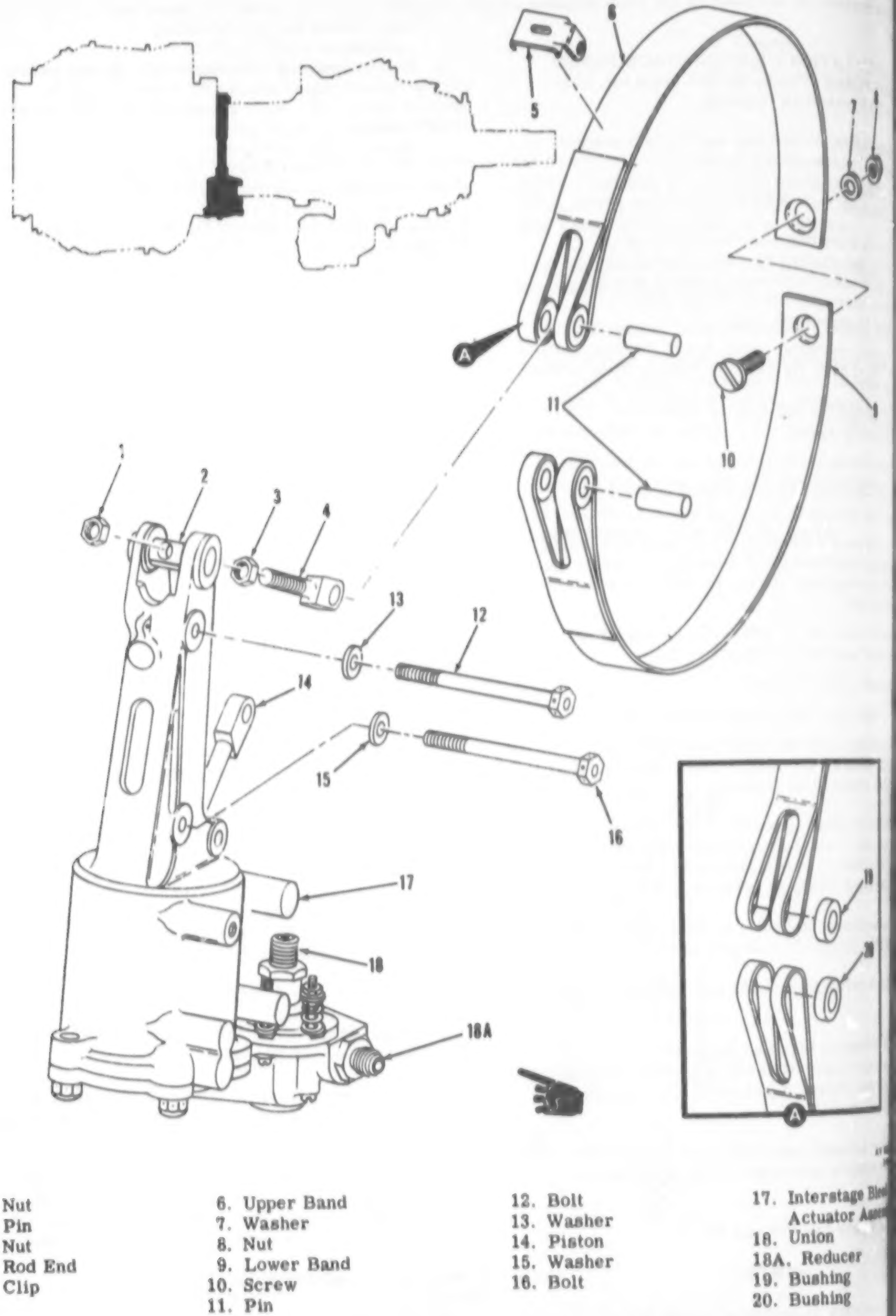
Handle bleed bands with care to avoid twisting or bending them.

a. Install upper band (6) through clips (5) on upper half of compressor housing, and lower band (9) through clips on lower half of compressor housing.

b. Place end of upper band (6) over end of lower band (9). Align screw holes and install screw (10) from inside the bands. Install washer (7) and nut (8) on screw. Hold screw and tighten nut as required.

c. Install bushings (19 and 20).

d. (Deleted)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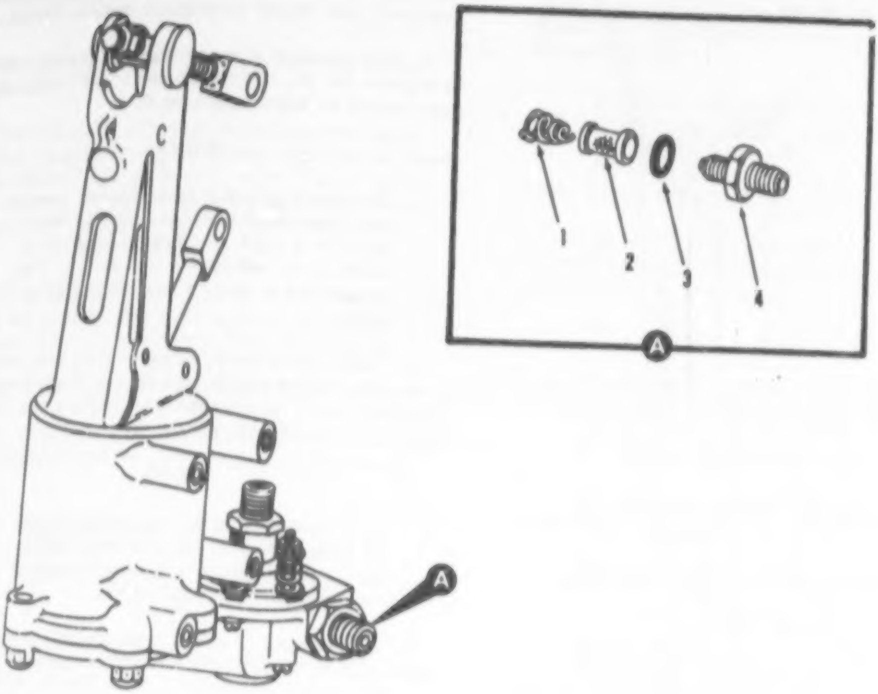
7
8
9
10
11
12
13
14
15
16
17
18
18A
19
20
A
A

1. Nut
2. Pin
3. Nut
4. Rod End
5. Clip
6. Upper Band
7. Washer
8. Nut
9. Lower Band
10. Screw
11. Pin
12. Bolt
13. Washer
14. Piston
15. Washer
16. Bolt
17. Interstage
    Actuator
18. Union
18A. Reducer
19. Bushing
20. Bushing

Figure 5-81. Interstage Bleed Actuator Assembly, Bleed Bands, and Attaching Parts



ring 2. Sediment Strainer 3. Packing 4. Reducer

Figure 5-81A. Sediment Strainer and Related Parts

Support interstage bleed actuator assembly (17) tach upper band (6) to rod end (4) with pin (11), tach lower band (9) to piston (14) with pin (11).

Position actuator assembly on mounting face to r housing and secure with bolts (12 and 16) and rs (13 and 15). Lockwire bolts.

Connect hose assembly from diffuser housing to or assembly and secure clamp with screw to or.

Connect hose assembly from fuel control to or assembly.

Connect clamps on lubrication hose assemblies cket on actuator assembly with screw and nut.

djust bleed bands. (Refer to paragraph 5-159A.)

. ADJUSTMENT OF BLEED BANDS. (See 5-81 and 5-81B.) The bleed bands shall be d whenever a new band assembly or interstage d actuator is installed. Travel of piston (14, 5-81) and tightness of band assembly are ad- by altering position of rod end (4).

NOTE

Rod end is secured to pin (2) with nuts (1 and 3).

a. Determine horizontal centerline of pin tapped hole in piston rod and mark this centerline on actuator housing. Place another mark on housing exactly one inch above first mark. (See figure 5-81B.)

b. Disconnect hose assembly connectors from union (18, figure 5-81) and reducer (18A).

NOTE

In following step c., at least one thread shall show beyond rod end (4) at all times.

c. Cut lockwire that secures nuts on either side of pin (2) at bottom of rod end (4). Back off nut (1) to end of threads.

NOTE

A travel of less than 1.0 inch or more than 1.2 inch is not acceptable.

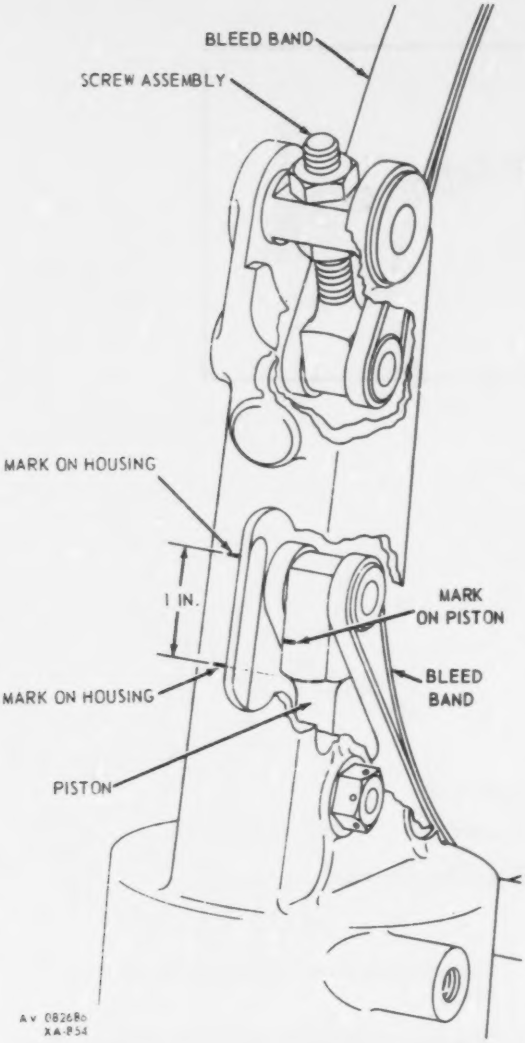


Figure 5-81B. Determining Rod Travel

d. Apply 60 psig metered air pressure to reducer (18A) on actuator. Place finger over block union (18) and measure travel at piston (14).

NOTE

The bleed band is positioned properly when torque on nut (3) increases.

e. Tighten nut (3) until bleed band is snug against compressor housing.

NOTE

After releasing finger from union in following step f. actuator should close. Closing will be indicated by rise of rod assembly.

f. Release finger from union and tighten nut (1). Reapply pressure.

g. If rod travel is within limits, proceed to following step l.

h. If rod travel is less than 1.0 inch, replace band assembly or actuator assembly, whichever required, and repeat preceding steps a. through

i. If rod travel is more than 1.2 inches, co to tighten nut (3), and check rod travel under pr sure stated in preceding step d.

NOTE

Clearance between compressor housing and bleed band at 60 psig air pressure must be a tight-to-drag fit as given in table 11-4, reference number 16. This requirement applies to all bleed port areas.

j. Close bleed band, using 60 psig regulated pressure. Using 0.002 inch feeler shim, check clearance between compressor housing and blee band in all bleed port areas.

NOTE

In following step k., the nut loosened in either method shall be referred to as locknut. The nut tightened shall be referred to as adjusting nut.

k. Adjust nuts (1 and 3, figure 5-81) to obtain clearance by either of following methods:

(1) Tighten band by loosening nut (1) and en nut (3).

(2) Loosen band by loosening nut (3) and ening nut (1).

l. When proper clearance has been establis tighten locknut and lockwire both nuts together.

m. Disconnect air pressure supply from red (18A). Connect each airbleed assembly connect its respective union or reducer.

n. Perform bleed band closure check of air actuator. (Refer to paragraph 5-159B.)

5-159B. BLEED BAND CLOSURE CHECK. Pr as follows:

a. A bleed band closure check should be per ed for the following conditions:

(1) When an interstage bleed actuator h repaired or replaced.

(2) When a fuel control has been replaced

(3) When airbleed system malfunction is pected.

b. Start the engine and stabilize for 5 mi Flight Idle. Ensure that the anti-icing and c airbleed are off.

c. Note the outside air temperature (OAT) in de- ees centigrade from the cockpit indicator and re- rd.

d. Slowly open the power lever until the bleed d closes.

e. For T53-L-7, -7A series engines the bleed d must remain closed at steady state speed above line shown in figure 5-81C. For T53-L-15/701 ies engines, the bleed band must remain closed eady state speed above line shown in figure 1D.

f. If the closure point does not fall within the al- able limits, shut down the engine and adjust the d band closure as follows: (See figure 5-82.)

(1) Remove lockwire and seal from locknut.

(2) Back out slotted lock screw three-quarters revolution from the center of the adjustment w.

(3) Hold the adjustment screw.

(4) Release the torque on the locknut.

NOTE

Turning adjustment screw clockwise will shift the bleed band closure point to a higher N1 speed. Turning counterclockwise will shift the bleed band closure point to a lower N1 speed.

(5) Rotate the adjustment screw as required up to a maximum of one-half revolution in either direction. (One-eighth turn equals approximately one percent N1 speed.)

(6) Hold adjustment screw and tighten the locknut. (Refer to table 11-3, reference number 89B.)

(7) Tighten the slotted lockscrew. (Refer to table 11-3, reference number 89C.)

(8) Start the engine and run up to verify the correct adjustment. (Repeat preceding steps (2) through (7), if required.)

(9) Lockwire associated components.

g. If interstage airbleed system does not function properly, check for the following defects.

(1) Leaks or obstructions in hoses or fittings.

(2) Clogged sediment strainer (2, figure 5-81A) in airbleed actuator.

(3) Sticking of piston in airbleed actuator.

(4) Improper adjustment of bleed band.

(5) Deposit of dirt and gum that prevents operation of fuel control airbleed valve. (See figure 5-83.)

(6) Ruptured airbleed actuator diaphragm.

h. Proceed as follows to correct the defects listed in preceding step g.

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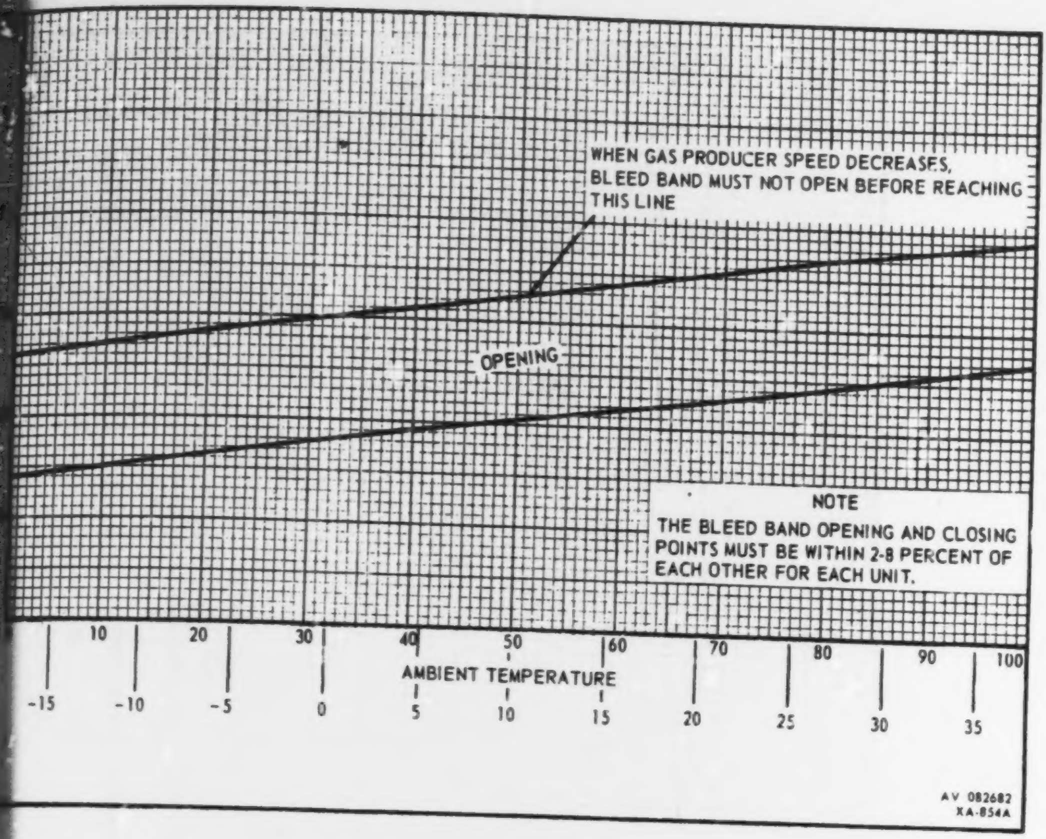
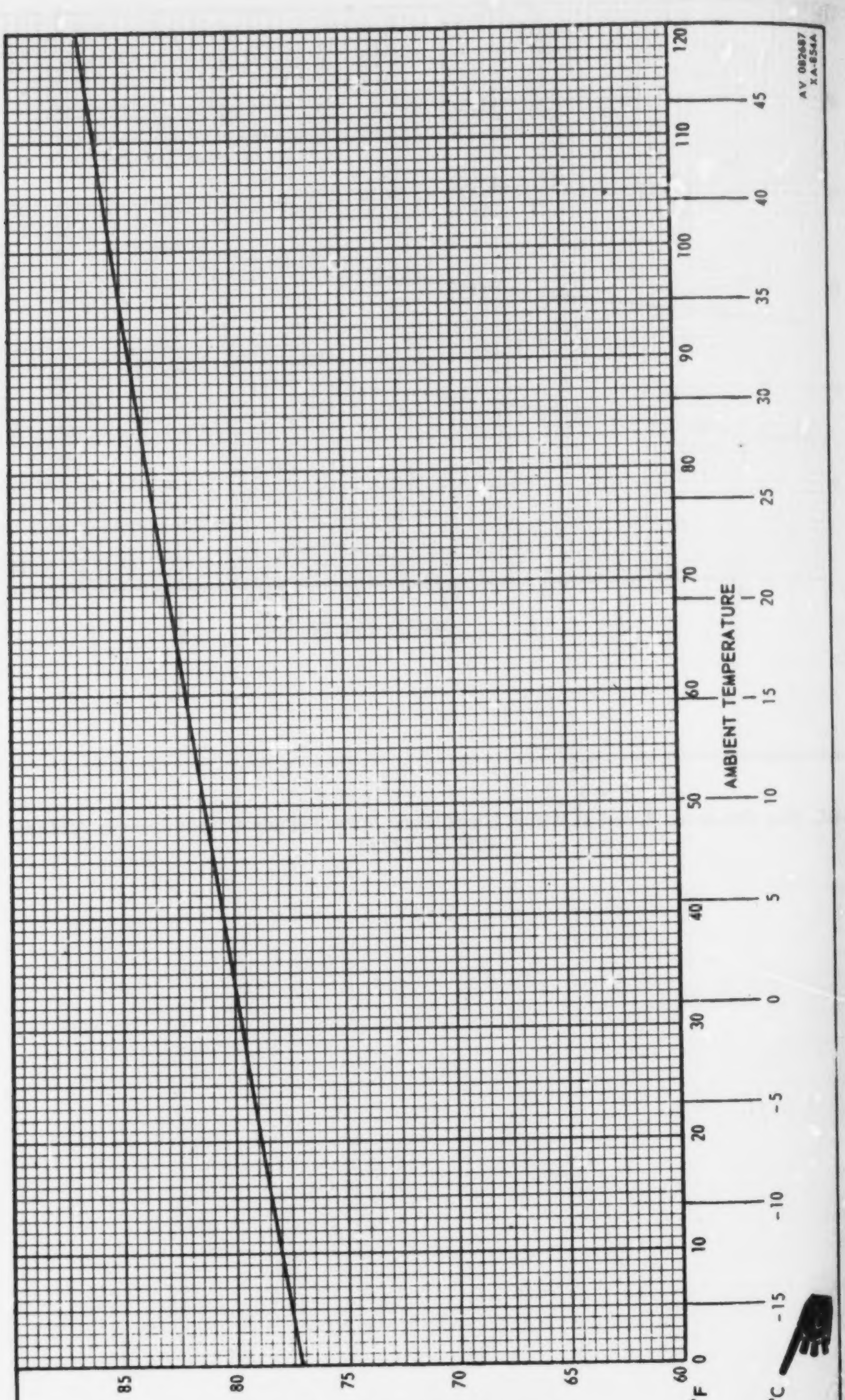


C. Gas Producer Speed at Which Bleed Band Must Remain Closed Versus Ambient Temperature (T53-L-7/7A)


GAS PRODUCER SPEED - N1 - % RPM
60
65
70
75
80
85
AMBIENT TEMPERATURE
°F
0
10
20
30
40
50
60
70
80
90
100
110
120
°C
-15
-10
-5
0
5
10
15
20
25
30
35
40
45
AV 082687
XA-654A

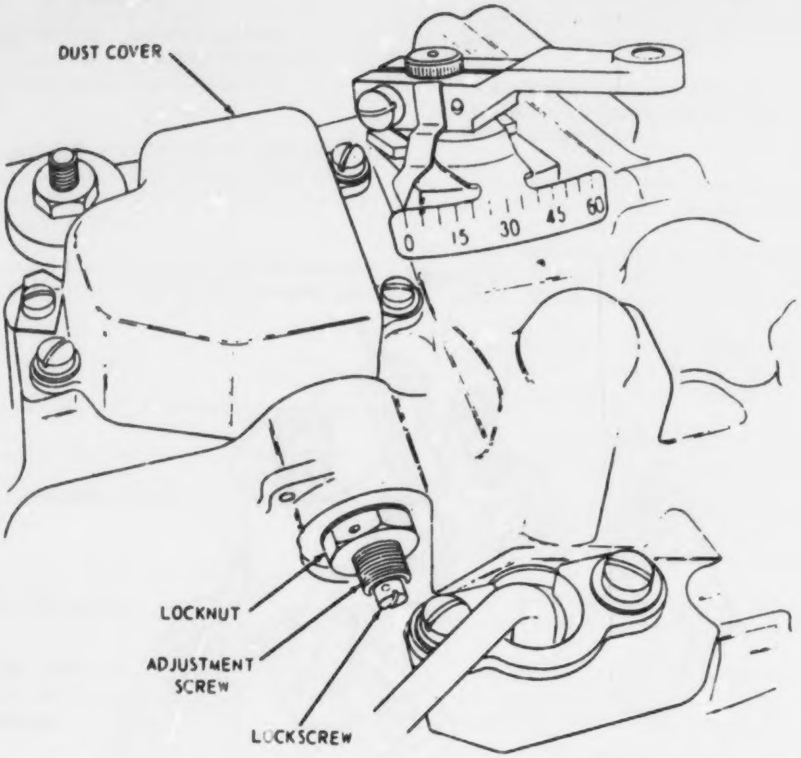


Figure 5-82. Bleed Band Adjustment

(1) Disconnect airbleed hose from reducer figure 5-81).

2) Connect a source of clean, dry air to hose w air through hose to determine that hose and r housing port are unobstructed.

3) If hose and diffuser housing port are clear, ect airbleed hose at fuel control and at air- ctuator union (18). Blow air through hose to ine that hose is unobstructed.

4) Connect source of clean, dry air to reducer n airbleed actuator.

NOTE

fter complying with following step (5), ctuator should close. Closing will be dicated by rise of rod assembly.

) Supply 7 to 11 psi metered air pressure to (18A). Cover union (18).

NOTE

fter complying with following step (6), ctuator should open. Opening will be dicated by drop of rod assembly.

(6) Uncover union (18).

(7) If diffuser housing port is obstructed, determine cause and remedy. Recheck actuator for proper operation.

(8) If hoses are obstructed, replace hoses. Recheck actuator for proper operation.

(9) If actuator does not open and close as indicated in preceding steps (4) through (6), replace actuator. Check new actuator for proper operation.

(10) If hoses and port are clear and actuator opens and closes as indicated in preceding steps (4) through (6), inspect airbleed valve of fuel control as described in following step i.

i. Remove dust cover from fuel control airbleed valve. Clean cover with drycleaning solvent (item 28, table 2-2).

j. Connect airbleed hose to the fuel control P3 port. (See figure 5-83.)

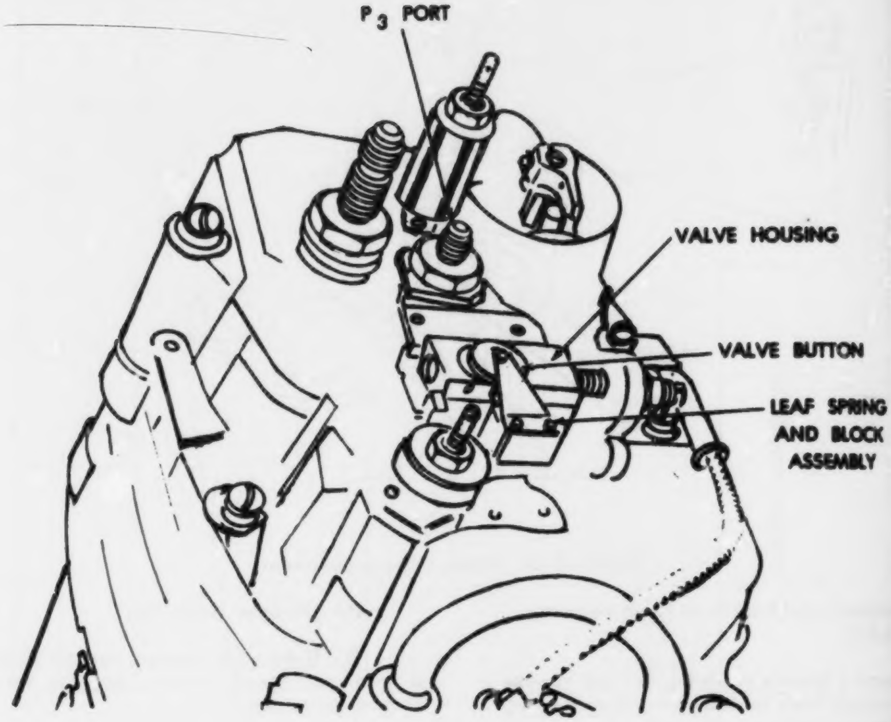

P3 PORT
VALVE HOUSING
VALVE BUTTON
LEAF SPRING AND BLOCK ASSEMBLY

Figure 5-83. Fuel Control Airbleed Valve

CAUTION

In following step k., the leaf spring, block, and valve button assembly must be rotated manually, as no tools are permitted.

k. Introduce spray of drycleaning solvent (item 28, ble 2-2) through the open end of hose while simul- neously rotating leaf spring, block, and valve but- on assembly (figure 5-83).

l. Spray exterior area of leaf spring, block, and lve button assembly with drycleaning solvent (item , table 2-2).

m. Repeat preceding step k.

n. Reconnect airbleed hose to airbleed actuator.

o. Perform an operational check of interstage leed actuator assembly. Refer to preceding steps through f. Reinstall dust cover over fuel control igger mechanism.

p. If bleed band still does not function properly, oceed with following step r.

q. Remove fuel control and place on a suitable rkbench. (Refer to paragraphs 5-79 and 5-82.)

CAUTION

In following step r., do not use tools to rotate leaf spring, block, and valve button assembly.

r. Manually rotate the leaf spring and block as- mbly to center the valve button over the orifice in valve housing. (See figure 5-83.)

CAUTION

In following step s., when removing valve button, ensure that leaf spring does not contact surface of valve housing (figure 5-83).

s. Apply small amount of liquid soap around valve on and introduce air at 60 psig to the P3 port (fig- 5-83). Observe button for signs of air leakage. move and replace button, P/N 76285, if leakage is dent.

Inspect valve housing contact surface for scor- (figure 5-83). If valve housing is scored, it will ate an abrasive action to erode button contact sur- and cause excessive leakage. Replace fuel con- if valve housing is heavily scored. (Refer to agraphs 5-80, 5-81, and 5-83.)

60. (Deleted)

61. (Deleted)

Figure 5-84 deleted

5-162. REMOVAL OF INLET GUIDE VANE ACTUATOR HOSES (T53-L-15/701 Engines). (See figure 5-85.) Proceed as follows:

a. Remove screws (13 and 14), nuts (10 and 11) that secure clamps (12 and 15) to accessory drive gearbox assembly.

b. Disconnect hose assembly (9) from union (8) and accessory drive gearbox assembly.

c. Remove union (8) with gasket (7) from inlet guide vane actuator assembly. Remove gasket from union. Plug open port on actuator housing.

d. Remove screws (19 and 22) and nuts (23 and 27) that secure clamps (20, 21, and 26) to bottom rear flange of compressor housing.

e. Tag hose assemblies (1 and 18) to identify port connections from which they will be removed.

f. Disconnect hose assembly (1) from elbow (4) and union (2) and hose assembly (18) from unions (17 and 24) and remove hose assemblies.

g. Remove unions (2 and 24) with gaskets (3 and 25) from inlet guide vane actuator assembly.

h. Remove union (17), elbow (4), nut (5), packing (6), and gasket (16) from fuel control. Remove gaskets and plug all open ports.

5-163. INSTALLATION OF INLET GUIDE VANE ACTUATOR HOSES (T53-L-15/701 Engines). (See figure 5-85.) Proceed as follows:

a. Remove plugs from ports. Position packing (6) and gasket (16) onto union (17) and elbow (4). Install union (17), elbow (4), and nut (5). Tighten as required.

b. Position gaskets (3 and 25) onto unions (2 and 24) and install unions into inlet guide vane actuator assembly. Tighten as required.

NOTE

Prior to installing hose assemblies (1 and 18), ensure that chafing sleeve is installed and positioned to prevent rubbing against nearby hoses, impeller housing, or airbleed housing.

Refer to identification tags installed at removal to ensure hose assemblies are connected to proper ports.

c. Connect hose assembly (1) to elbow (4) and union (2) and hose assembly (18) to unions (17) and 24). Tighten hose connections.

d. Secure clamps (20, 21, and 26) to bottom rear flange of compressor housing with screws (19 and 22) and nuts (23 and 27).

e. Position gasket (7) onto union (8) and install union into inlet guide vane actuator assembly. Tighten as required.

f. Connect hose assembly (9) to union (8) and accessory drive gearbox assembly. Tighten hose connectors.

g. Secure clamps (12 and 15) to accessory drive gearbox assembly with screws (13 and 14) and nuts (10 and 11).

5-164. REMOVAL OF INLET GUIDE VANE ACTUATOR ASSEMBLY (T53-L-15/701 Engines). (See figure 5-86.) Proceed as follows:

a. Release torque on "B" nuts to CYL 1 and C
2 lines at actuator. (See figure 5-86A.) Position
actuator to vane full open position. Record vari
inlet guide vane degree position on fuel control
cator plate.

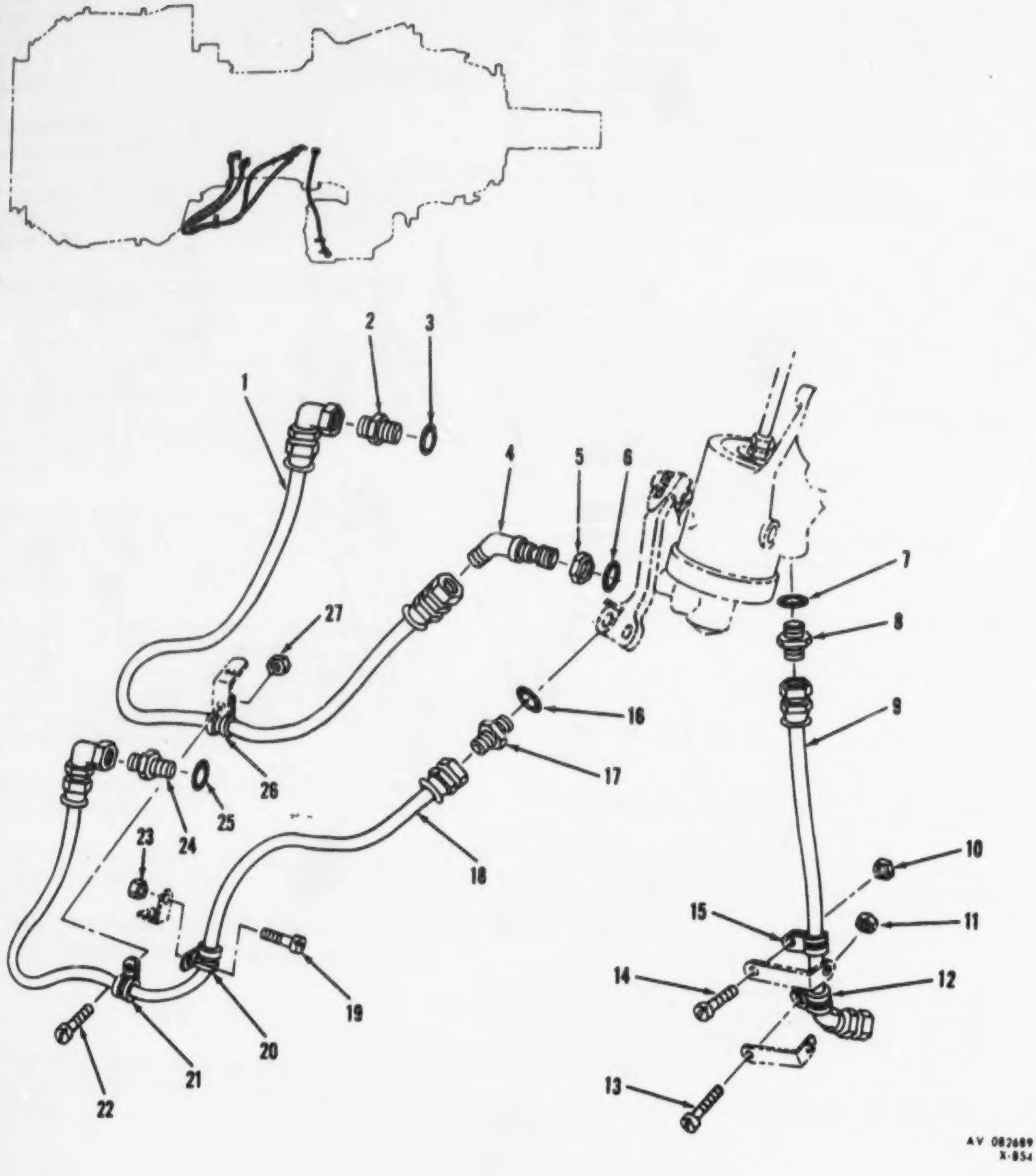
b. Remove pin (25, figure 5-86), nut (24),
(26), bolts (10) and washers (11 and 12), that
tube assembly (15).

c. Cut lockwire and loosen nut (5). Unscrew
ing (6) from connector.

d. Remove bolts (1, 27, and 27A), washers (
27B), support (3), spacer (4), and nuts (7, 8A and

e. Carefully remove inlet guide vane actuator
sembly (8) from engine.

Pages 5-111 through 5-114 deleted.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AV 082689
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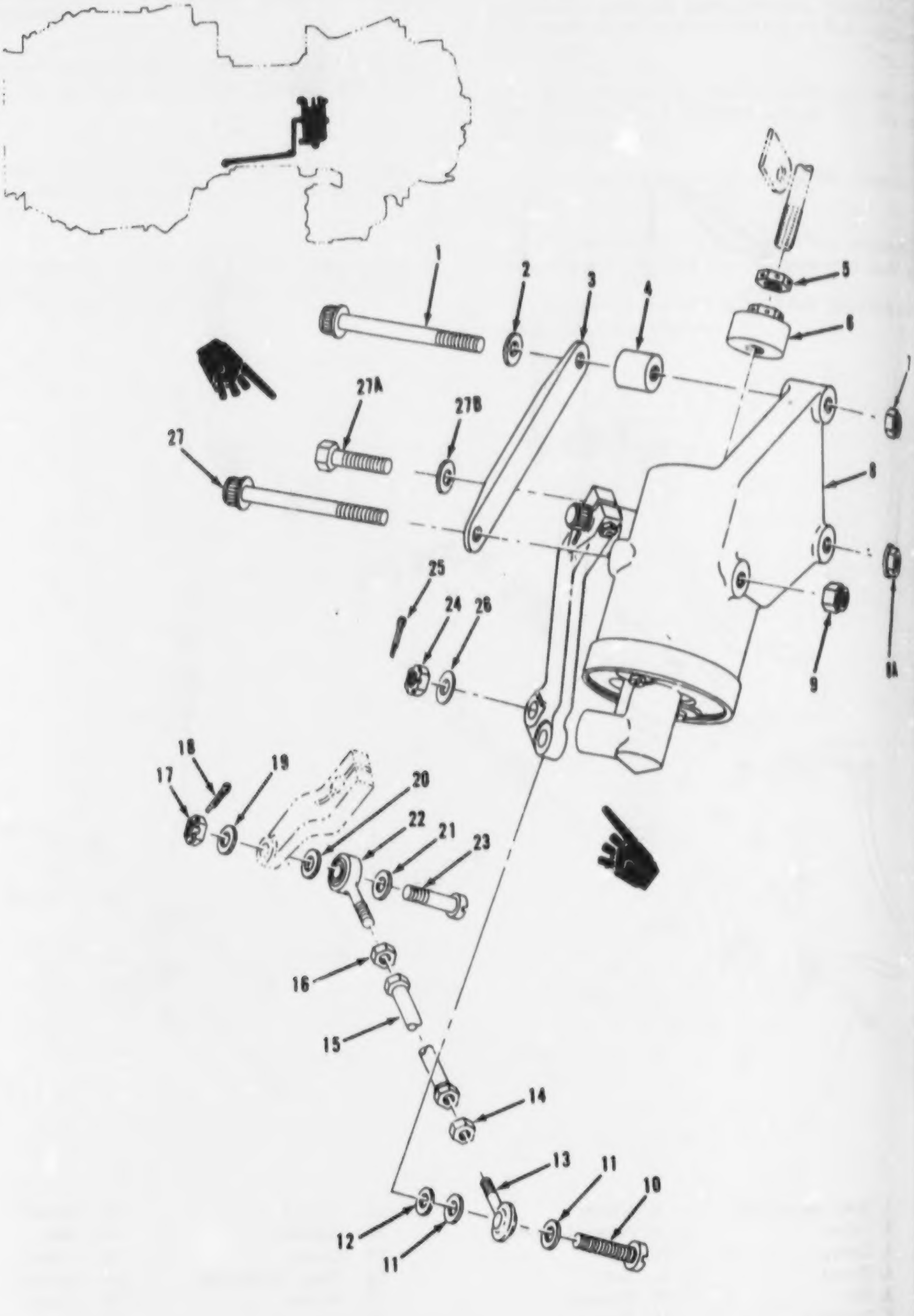
1. Hose Assembly
2. Union
3. Gasket
4. Elbow
5. Nut
6. Packing
7. Gasket
8. Union
9. Hose Assembly
10. Nut
11. Nut
12. Clamp
13. Screw
14. Screw
15. Clamp
16. Gasket
17. Union
18. Hose Assembly
19. Screw
20. Clamp
21. Clamp
22. Screw
23. Nut
24. Union
25. Gasket
26. Clamp
27. Nut

Figure 5-85. Inlet Guide Vane Actuator Hoses and Attaching Parts (T53-L-15/701)


1
2
3
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5
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8A
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27A
27B
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22
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23
16
15
14
13
11
10
12
11

Figure 5-86. Inlet Guide Vane Actuator Assembly and Attaching Parts (T53-L-15/701)

Key to Figure 5-86.

	olt
	asher
	pport
	acer
	t
	earing
	t
	let Guide Vane ctuator Assembly
8A.	Nut
9.	Nut
10.	Bolt
11.	Washers
12.	Washer
13.	Rod End Bearing
14.	Nut
15.	Tube Assembly
16.	Nut
17.	Nut
18.	Cotter Pin
19.	Washer
20.	Washer
21.	Washer
22.	Rod End Bearing
23.	Bolt
24.	Nut
25.	Cotter Pin
26.	Washer
27.	Bolt
27A.	Bolt
27B.	Washer

. INSTALLATION OF INLET GUIDE VANE UATOR ASSEMBLY (T53-L-15/701 Engines). igure 5-86.) Proceed as follows:

Position inlet guide vane actuator assembly (8) ar flange of inlet housing.

NOTE

When securing actuator assembly, use washers (2) as required to prevent threaded end of bolt from rubbing against inlet housing.

Secure actuator assembly with bolts (1, 27, 7A), washers (2 and 27B), support (3), spacer nd nuts (7, 8A and 9). Tighten nuts as re- d and lockwire.

Thread bearing onto connector. Hold actuator en; (piston retracted) adjust bearing until end t-mark area on connector aligns with open mark on rigging plate (located on inlet housing). gure 5-86A.) Tighten nut (5, figure 5-86) as ed and secure with lockwire.

Connect tube assembly (15) to run position of r arm as follows:

1) Install washer (11) on bolt (10) and insert rough rod end bearing (13).

2) Install two washers (11 and 12) on bolt (10) ert bolt through RUN position hole in actuator

NOTE

nsure that washers of the proper thick- ess are located on each side of the rod nd bearing.

(3) Install washer (26) on bolt (10).

NOTE

Use a quantity of washers (26) as required to obtain a minimum clearance between nut (24) and pin (25).

(4) Install nut (24) on bolt (10) and tighten as required.

CAUTION

Ensure that the rod end bearing is not contacting the actuator arm.

(5) Install cotter pin (25) in hole in bolt (10) and secure.

NOTE

The bolt (10) must be free to rotate about its axis.

e. Hold actuator in full open position.

f. Adjust rod end bearings (13 and 22) until indicator of fuel control lever aligns with previously recorded position on fuel control indicator plate. (Refer to paragraph 5-164, step a.)

g. Center tube assembly (15, figure 5-86) and tighten nuts (14 and 16) as required and lockwire. Tighten nut (24) as required. Install pins (18 and 25).

h. Connect hoses to proper ports of actuator assembly.

i. (Deleted)

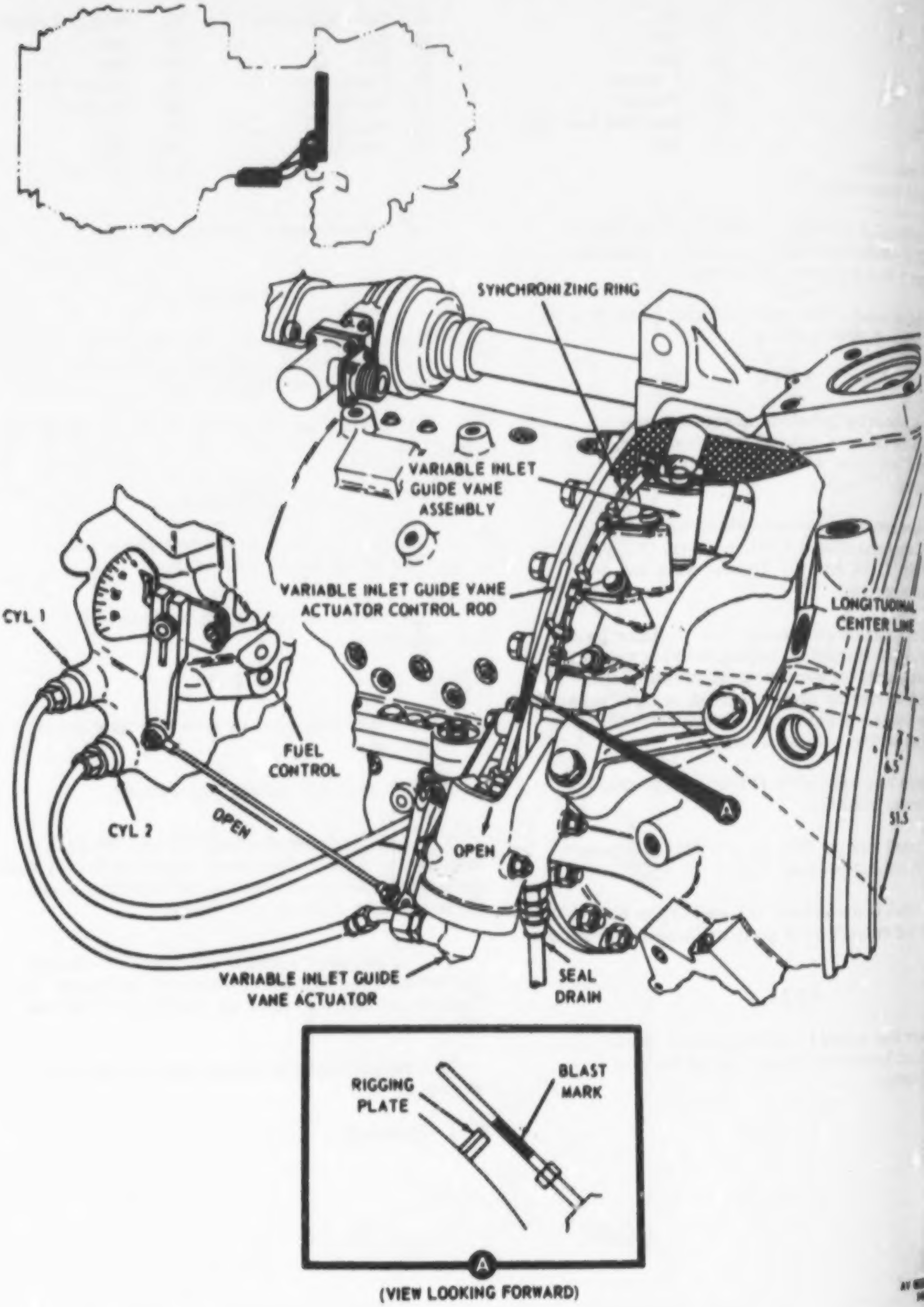

SYNCHRONIZING RING
VARIABLE INLET GUIDE VANE ASSEMBLY
VARIABLE INLET GUIDE VANE ACTUATOR CONTROL ROD
LONGITUDINAL CENTER LINE
7
6.5
51.5
CYL 1
CYL 2
FUEL CONTROL
OPEN
OPEN
A
VARIABLE INLET GUIDE VANE ACTUATOR
SEAL DRAIN
RIGGING PLATE
BLAST MARK
A
(VIEW LOOKING FORWARD)

Figure 5-86A. Variable Inlet Guide Vane (VIGV) System (T53-L-15/701)

66. OPERATIONAL CHECK OF VARIABLE IN- T GUIDE VANE ACTUATOR ASSEMBLY. 3-L-15/701 Series Engine). Proceed as follows:

a. An operational check of the inlet guide vene actuator embly must be performed whenever the fuel control is re- ced, inlet guide vane actuator assembly is replaced, or im- per operation of the actuator is suspected.

b. Improperly adjusted variable inlet guide vanes (VIGV) have adverse effect on engine operation. If the IGV's to reach the "full open" position, the engine will exhibit torque, low exhaust gas temperature (EGT), and high N1 d. Should the inlet guide vanes reach the "full open" ition at too low an N1 speed, any rapid N1 speed changes ld induce surge. Since the "full open" point is most crit- in regard to engine performance, this has been the tradi- al adjustment point. Testing has shown that the IGV's be adjusted in most cases at the point where they begin pen. While adjustment at this point is not as conclusive adjustment at the "full open" position, it has the advan- of not requiring a flight test and, therefore, is less time uming.

. It is suggested that adjustment of the VIGV be per- ned at the "begin to open" point. If this adjustment is sensitive enough, adjustment at the "full open" position ld be made.

. Adjustment of the VIGV can be performed anywhere hin the allowable range and should be done in in- ents of one percent N1 speed. For example: If an engine bits low power, low EGT, and high N1 speed, and the V adjustment point falls at the upper portion of the al- ble range, the adjustment point may be lowered (within range) in one percent increments until the problem is d.

Perform a static check of the actuator piston to ensure om of travel within the housing as follows:

NOTE

To preclude damage/distortion to VIGV components, ensure that torque in "B" nuts to CYL 1 and CYL 2 lines at actuator are released. (See Fig. 5-86A).

inlet guide vane actuator to full open position. of arrowhead must be lined up within 0.02 inch end of shot blast area on connector rod. If ar- ad position is same as line scribed during bly, arrowhead will be superimposed over scribed

CAUTION

Position the assembly to provide adequate clearance with the feedback rod and arm in ollowing step f.

NOTE

The pressure switch in following step f should be set to indicate minimum of 75 psi.

f. To adjust VIGV at "begin to open" point, install switch and coupling assembly (LTCT 13725) between VIGV actuator and cyl 2 line (see figure 5-87). Installation of switch and coupling assembly can be accomplished by disconnecting the VIGV flex line from the fuel control (see figure 5-86A). Connect the no 2 cyl flex line to the "T" fitting of the switch and coupling assembly. Use a suitable flex line of approximately 10 in length, with a 90° female fitting on one end) to connect to fuel control fitting. Connect the other end of this flex line to the "T" fitting on the switch and coupling. The adapter fitting on the "T" fitting will have to be removed for this hook up procedure.

g. Disconnect electrical connector from one of the two fuel control pump pressure switches (located on the engine mount, left side of the engine, and connect this connector to the connector of the switch and coupling assembly (see figure 5-87). The fuel pressure warning light located at the top left corner of the caution annunciator panel (located in the cockpit) will now be used to indicated guide vane operation.

h. Start Engine and allow engine to stabilize at ground idle. Check for fuel leaks.

i. Ensure that anti-icing, heater, and airconditioning systems are off. (Refer to applicable airframe manuals).

NOTE

Do not connect switch and coupling assembly connector to fuel pressure switch located on engine mount.

j. Slowly increase N1 speed above flight idle. Record N1 speed and outside air temperature (OAT) when fuel pressure warning light activates. Repeat this check three times to obtain a mean N1 reading.

k. Enter graph in figure 5-88 at the lower band at the N1 speed and OAT obtained in preceding step j. Verify that the N1 speed falls within this band.

NOTE

Adjustments of the VIGV in following step 1 should be made in increments of 1 percent N1 speed.

l. If N1 speed does not fall within the allowable band (See figure 1-30), adjust VIGV as follows:

(1) Adjust feedback rod by disconnecting rod at actuator loosening rod end jam nut, and adjust rod length. Shorten feedback rod to decrease N1 speed at which VIGV "begin to open". Lengthen rod to increase "begin to open" N1 speed.

(2) Five turns of feedback rod end will result in approximately a 2 percent change in N1. Both rod ends may require adjustment to maintain the same amount of thread engagement at both ends of the rod.

m. Repeat preceding steps h through l.

n. Remove switch and coupling assembly (LTCT 13725, detail of switch and coupling kit LTCT 13726) at completion of check. Reconnect CYL 2 to actuator. Tighten "B" nut on CYL 2 line to required torque. Perform a leak check prior to releasing the aircraft for flight.

NOTE

Prior to performing a VIGV check at the "full open" point, ensure that the rigging is correct as outlined in preceding step e.

o. To adjust the VIGV at the "full open" point, install switch and coupling assembly (LTCT 13725, detail of switch and coupling kit LTCT 13727) between the VIGV actuator and CYL 1.

p. Perform procedures outlined in preceding steps g through i.

CAUTION

When the engine is run do not exceed maximum N1 (101.5 percent), torque to EGT limits.

q. Perform power check and trim adjustment. Note when the fuel pressure warning light goes out and simultaneously read N1 speed and OAT (this is the point where the VIGV's are completely open). Repeat this check three times to obtain a VIGV mean "full open" N1 speed.

r. Enter graph in fig. 5-88 at the upper band for the OAT in preceding step 1 and determine N1 speed at which the VIGV shall be completely open. If N1 speed recorded in preceding step 1 does not fall within the limits given in fig. 5-88, adjust as follows:

(1) Shorten VIGV actuator feedback rod to decrease N1 speed at which VIGV reach "full open" position.

(2) Lengthen VIGV actuator feedback rod to increase N1 speed at which VIGV reach "full open" position.

s. Upon completion of adjustments, disconnect switch and coupling assembly (ref: fig. 5-87) from the fuel pressure warning light connector. Re-connect fuel pressure warning light connector to pressure switch located on engine mount.

t. Remove assembly from VIGV actuator and CYL 1 line. Reconnect line to actuator. Tighten "B" nut on CYL 1 line to required torque. Perform a leak check prior to releasing aircraft for flight.

u. Lockwire connectors previously lockwired.

v. If the switch and coupling assembly (LTCT 13725, detail of switch and coupling kit LTCT 13726) are not available and low power complaints or surges are experienced, a trial-and-error method of shortening or lengthening the feedback rod with a subsequent test flight to determine engine performance is recommended.

w. If a fuel control change is necessary and the switch and coupling assembly (LTCT 13725, detail of swi coupling kit LTCT 13726) or the pressure switch and ting assembly are not available, proceed as follow

(1) Rig feedback rod to align VIGV protra tioning with zero on fuel control quadrant plate wi full open.

(2) Perform a power check and trim adjustm lined in preceding paragraph 5-86. If engine exhi torque, low EGT and high N1 speed, shorten feedb accordingly.

x. A periodic functional check to ensure prope of the switch and coupling assembly (LTCT 1372 switch and coupling kit LTCT 13726) is recommend the following method:

(1) Cap off one end of switch fitting and attach trollable source of pressurized filtered air to the othe

(2) Connect a continuity meter to each pin of sure switch.

(3) Apply filtered air pressure to switch and for continuity between pins. Pressure should indica 80 psi. Replace switch if defective.

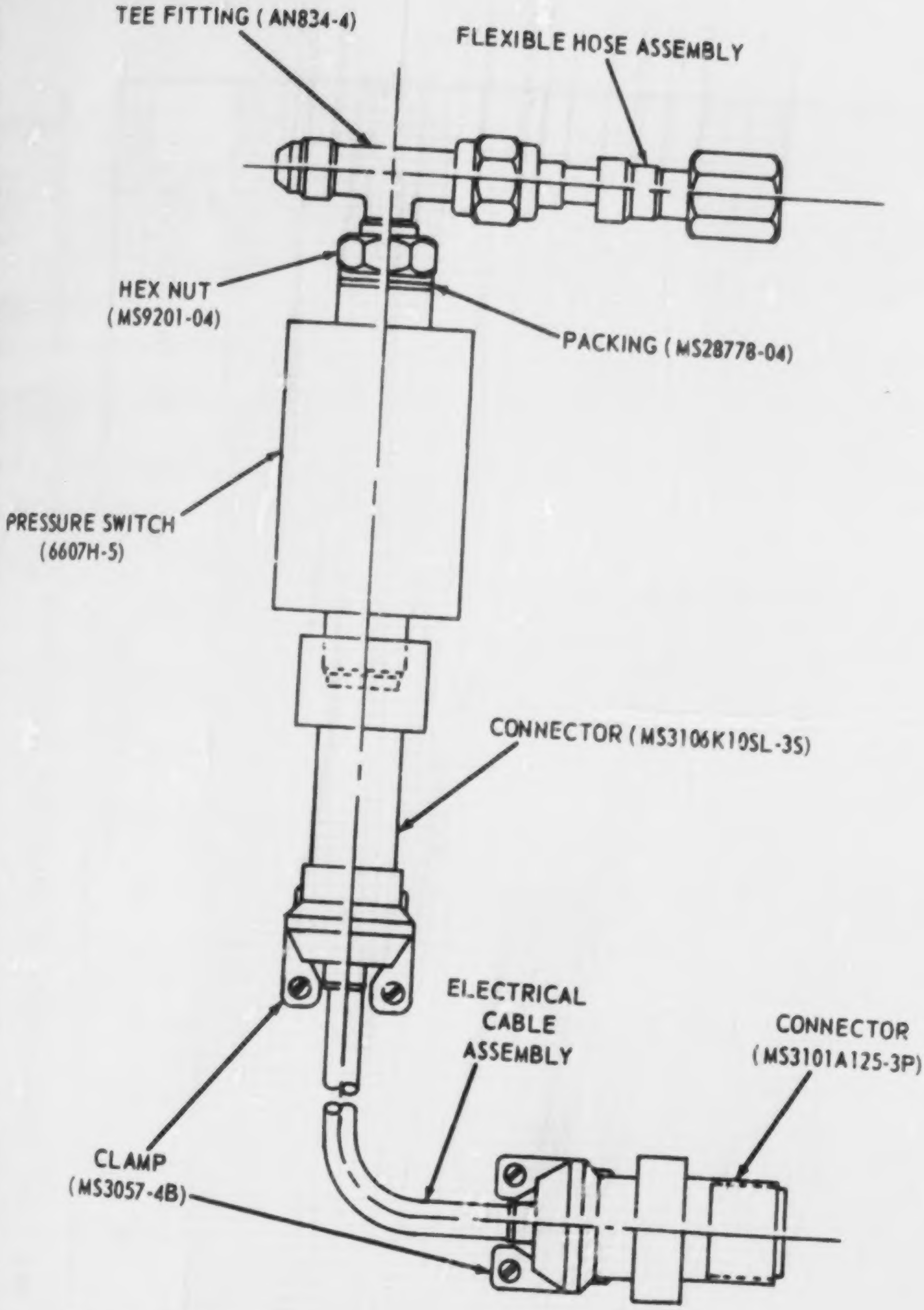

TEE FITTING (AN834-4)
FLEXIBLE HOSE ASSEMBLY
HEX NUT
(MS9201-04)
PACKING (MS28778-04)
PRESSURE SWITCH
(6607H-5)
CONNECTOR (MS3106K10SL-3S)
ELECTRICAL
CABLE
ASSEMBLY
CONNECTOR
(MS3101A12S-3P)
CLAMP
(MS3057-4B)

Figure 5-87. Switch and Coupling Assembly (T53-L-15/-701 Series)

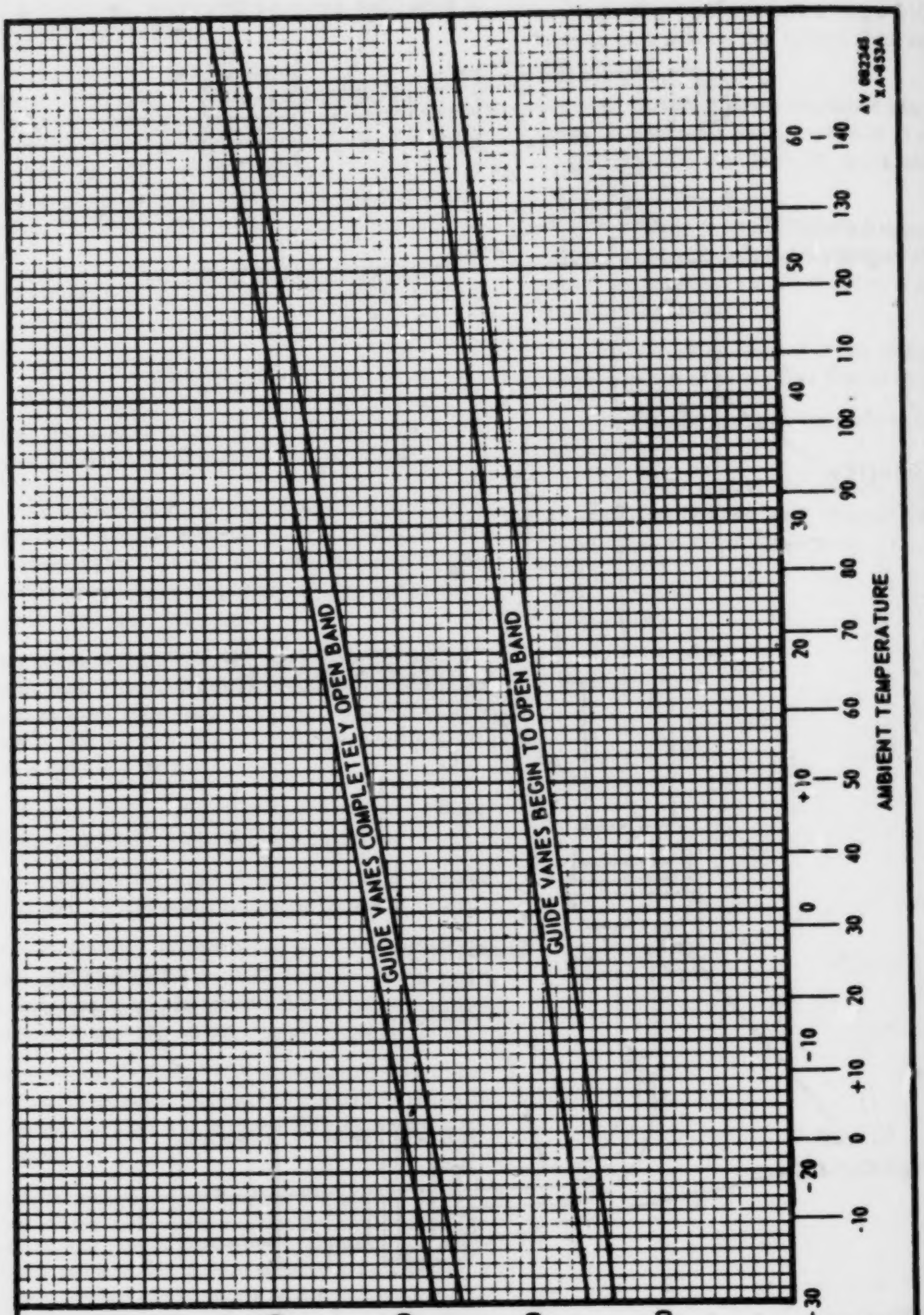


Figure 5-88. Gas Producer Speed at Which Inlet Guide Vanes Operates Versus Ambient Temperatures

CHAPTER 6

ENGINE DISASSEMBLY

GENERAL.

This section contains instructions for disas-
y of engine subassemblies and engine acces-
. Also included is general precautionary
ation. Instructions for cleaning, inspection,
pair of accessories are given in Chapter 7.

PRECAUTIONS.

Refer to Chapter 3, Section II, paragraph 3-31.

MARKING ON MATERIALS SUBJECT TO HIGH ERATURES.

Refer to Chapter 3, Section II, paragraph 3-32.

DISASSEMBLY OF ENGINE SUBASSEMBLIES.

DISASSEMBLY OF OVERSPEED GOVERNOR
ACHOMETER DRIVE ASSEMBLY (T53-L-7/
Engines) (ORGANIZATIONAL MAINTENANCE).
ure 6-1.) Proceed as follows:

Unscrew and remove plug (1 or 11) from hous-
emove packing (2) from plug.

b. Remove filter (10) or filter assembly (3). If filter assembly (3) was removed, remove remaining packing (2).

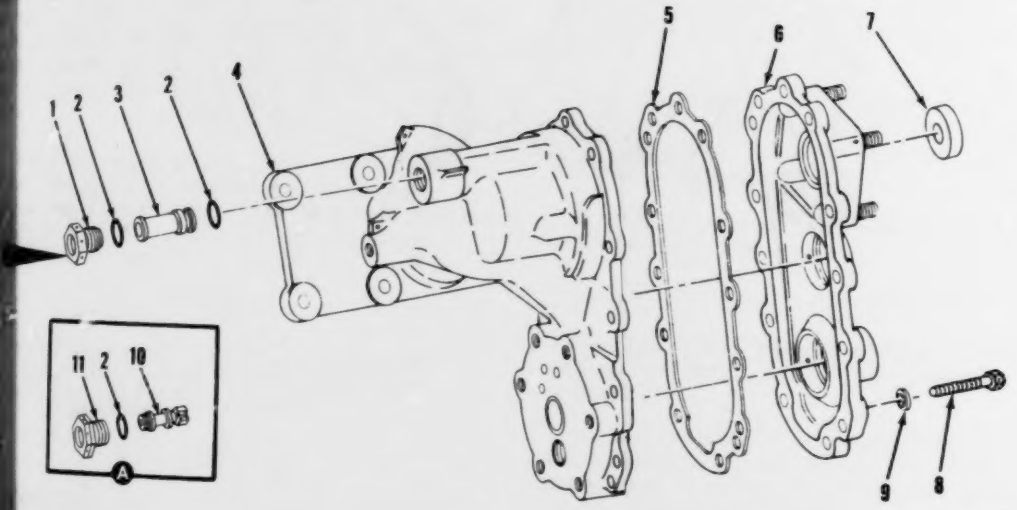
c. Remove bolt (8), washers (9), cover assembly (6), and gasket (5). Using arbor press and sleeve bushing (LTCT3640), press seal (7) out of cover assembly (6).

6-9. DISASSEMBLY OF OVERSPEED GOVERNOR AND TACHOMETER DRIVE ASSEMBLY (T53-L-701 Engine) (ORGANIZATIONAL MAINTENANCE). (See figure 6-2.) Proceed as follows:

a. Unscrew and remove plug (1) from housing. Remove packing (2) from plug.

b. Remove filter assembly (3). If filter assembly (3) was removed, remove remaining packing (2).

6-10. DISASSEMBLY OF OVERSPEED GOVERNOR AND TACHOMETER DRIVE ASSEMBLY (T53-L-7/7A/15 Engines) (DS AND GS MAINTENANCE). (See figure 6-3.) Proceed as follows:



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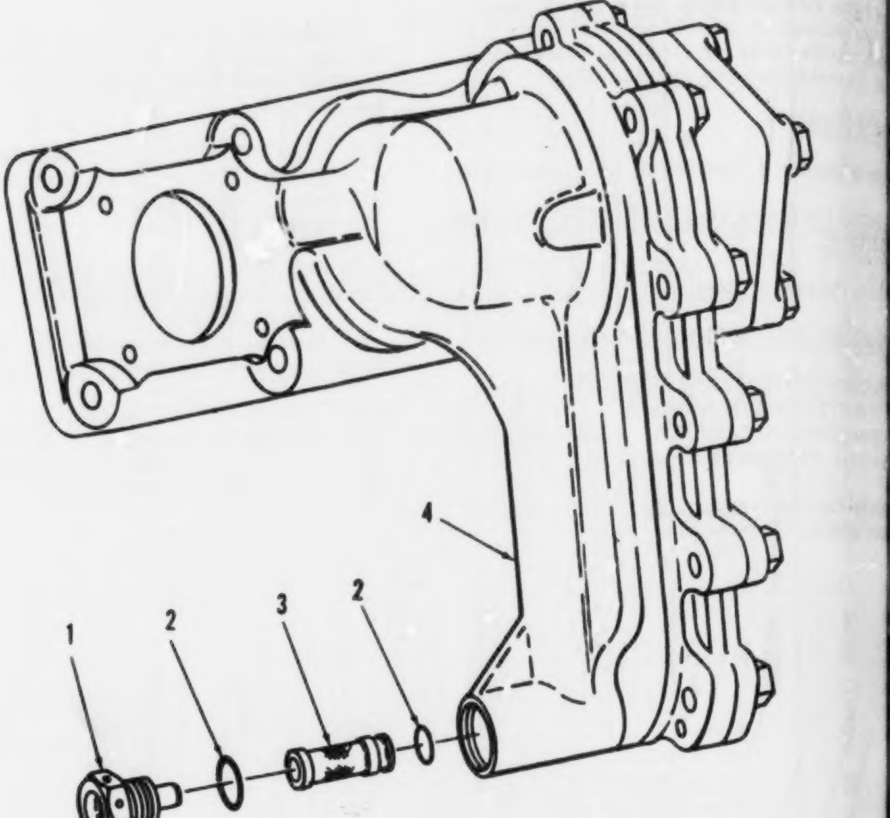
Plug
Packing
Filter Assembly
Overspeed Governor and Tacho-
meter Drive Assembly

5. Gasket
6. Cover Assembly
7. Seal
8. Bolt
9. Washer
10. Filter
11. Plug

re 6-1. Overspeed Governor and Tachometer Drive Assembly (T53-L-7/7A/15) (Organizational Maintenance) - Exploded View



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1. Filter Plug
2. Packing
3. Filter Assembly
4. Overspeed Governor and Tachometer Drive Assembly

Figure 6-2. Overspeed Governor and Tachometer Drive Assembly (T53-L-701) (Organizational
Exploded View

Remove bolts (47) and washers (46) that secure r-driven rotary (booster) pump (45) to housing

Remove booster pump and packing (44).

Remove plug (62) and packing (63).

Straighten tabs on tabwasher (9). Using wrench T215), remove nut (8). Remove relief valve nbly (7).

Unscrew and remove adjusting screw (10). Re- spring relief valve spring (11), relief valve er (12), packing (13), relief valve body (14), ckings (15 and 16).

Remove bolts (38), washers (39), cover assem- 3), and housing gasket (34). Press oil seal (32) housing with arbor press and sleeve bushing T3640).

Remove overspeed governor and tachometer intermediate gear (36) with bearings (35 and 37) led. Using bearing puller (LTCT675), remove gs from gear.

Remove overspeed governor drive shaftgear (41) earings (40 and 42) installed. Using bearing (LTCT916 or LTCT97), remove bearings from ear.

Install holding device (LTCT2044 or LTCT278), ng splines of device with internal splines of drive shaftgear (49). Straighten tabwasher (29) sing wrench (LTCT1109 or LTCT214), remove r nut (28). Remove tabwasher (29), tacho- shaftgear (30), and key (31). Remove holding .

Straighten tabwashers (57) and remove bolts d tabwashers (57) that secure upper drive ar and liner assembly (48). Withdraw assem- m housing (43). Remove bearing retainer d shims (52 and 55).

NOTE

To facilitate reassembly, record thickness of each shim and the side of bearing liner 53) from which it was removed.

CAUTION

Do not drop upper drive shaftgear (49) while removing bearings in following step k.

Place upper drive shaftgear (49) in gearshaft (LTCT2037 or LTCT277) and, using wrench 161 or LTCT213), straighten tabs on tab- (59). Remove spanner nut (60). Remove er (59). Using arbor press, push upper haftgear (49), with ball bearing (50) installed, earing liner (53). Remove bearing spacer , using bearing removing tool (LTCT231), push ball bearing (54) out of liner. Using puller (LTCT675), remove ball bearing (50) from upper drive shaftgear (49).

l. Remove bolts (27) and tabwashers (26) that secure tachometer drive shaftgear and liner assembly (17) to housing (43). Withdraw shaftgear and liner assembly, and remove bearing retainer (25) and shims (21 and 24).

NOTE

To facilitate reassembly, record thickness of each shim and the side of bearing liner (22) from which it was removed.

m. Using arbor press, push tachometer drive gearshaft (18), with bearing (19) installed, out of bearing liner (22). Remove spacer (20) and, using puller (LTCT675), remove bearing (23) out of liner. Using puller (LTCT675), remove bearing (19) from shaftgear.

n. Remove plug (1 or 4) from housing (43). Remove packing (2) from plug.

NOTE

When filter assembly (3) is installed, filter (5) and throttle assembly (6) are not installed.

o. Remove filter assembly (3) or filter (5) and throttle assembly (6). Remove remaining packing (2) from filter assembly (3) or throttle assembly (6).

6-11. DISASSEMBLY OF OVERSPEED GOVERNOR AND TACHOMETER DRIVE ASSEMBLY (T53-L-701 Engine) (DS AND GS MAINTENANCE). (See figure 6-4.) Proceed as follows:

a. Remove overspeed governor and tachometer drive assembly from engine.

b. Remove plug (26) and packing (25).

c. Remove plug (34) with packing (33) and remove packing from plug. Remove filter assembly (32) and packing (31).

d. Remove bolts (23), washers (24), cover and seal assembly (16), and gasket (19). Press seal (17) out of cover assembly (18) using arbor press and sleeve bushing (LTCT3640).

e. Remove gear (21) with bearings (22 and 20) installed.

f. Using puller (LTCT675), remove bearing (22 and 20) from shaft of gear (21).

g. Remove gearshaft (28) with bearings (29 and 27) installed.

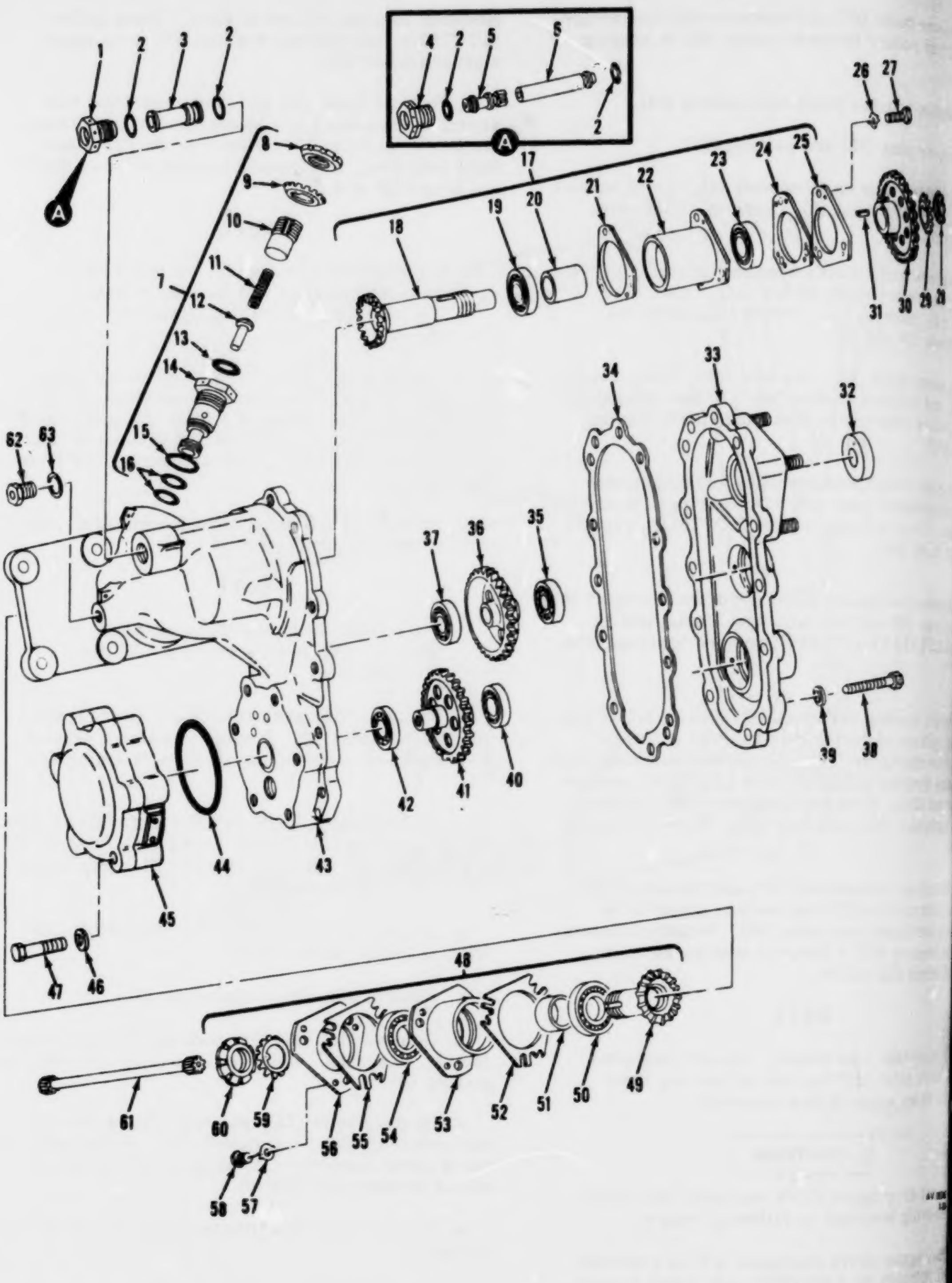
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Figure 6-3. Overspeed Governor and Tachometer Drive Assembly (T53-L-7/7A/15) (DS and GS Mainte ance) - Exploded View

Key to Figure 6-3.

1. Plug
2. Packing
3. Filter Assembly
4. Plug
5. Filter
6. Throttle Assembly
7. Relief Valve Assembly
8. Nut
9. Tabwasher
10. Adjusting Screw
11. Relief Valve Spring
12. Relief Valve Plunger
13. Packing
14. Relief Valve Body
15. Packing
16. Packing
17. Tachometer Drive Shaftgear and Liner Assembly
18. Tachometer Drive Gearshaft
19. Bearing
20. Spacer
21. Shim
22. Bearing Liner
23. Bearing
24. Shim
25. Bearing Retainer
26. Tabwasher
27. Bolt
28. Spanner Nut
29. Tabwasher
30. Tachometer Shaftgear
31. Key
32. Seal
33. Cover Assembly
34. Housing Gasket
35. Bearing
36. Overspeed Governor and Tachometer Drive Intermediate Gear
37. Bearing
38. Bolt
39. Washer
40. Bearing
41. Overspeed Governor Drive Shaftgear
42. Bearing
43. Housing and Liner Assembly
44. Packing
45. Power-Driven Rotary (Booster) Pump
46. Washer
47. Bolt
48. Upper Drive Shaftgear and Liner Assembly
49. Upper Drive Shaftgear
50. Ball Bearing
51. Bearing Spacer
52. Shim
53. Bearing Liner
54. Ball Bearing
55. Shim
56. Bearing Retainer
57. Tabwasher
58. Bolt
59. Tabwasher
60. Spanner Nut
61. Spline Shaft
62. Plug
63. Packing

---

h. Using puller (LTCT916 or LTCT97), remove arings (29 and 27) from gearshaft (28).

i. Install holding device (LTCT2044 or LTCT278), shing splines of holding device with internal splines gearshaft assembly (36), and secure to housing liner assembly (30) with suitable bolts and shers. Straighten key washer (13) and, using ench (LTCT1109 or LTCT214), remove spanner (12). Remove key washer, gear (14), and key). Remove holding device.

NOTE

To facilitate reassembly, record the thickness of each shim and the side of the bearing retainer from which it was removed in following step j.

. Straighten tabwashers (10), and remove screws) and tabwashers that secure bearing and liner asbly (1) to housing and liner assembly (30). With- assembly and remove plate (9) and shims (5 and

. Using arbor press and suitable adapter, press rshaft assembly (2), with bearing (3) and spacer installed, out of liner (6).

. Remove spacer (4) and, using bearing puller CT916 or LTCT97), remove bearing (3) from rshaft assembly (2). Using bearing removal tool CT231), remove bearing (7) from liner (6).

NOTE

To facilitate reassembly, record the thickness of each shim and the side of the bearing retainer from which it was removed in the following step m.

m. Straighten tabwashers (44), and remove screws (45) and tabwashers that secure the bearing and liner assembly (35) to the housing and liner assembly (30). Withdraw bearing and liner assembly from housing and liner assembly and remove plate (43) and shims (39 and 42).

n. Place gearshaft assembly (36) in gearshaft holder (LTCT2037 or LTCT277). Straighten key washer (46) and, using wrench (LTCT2161 or LTCT213), remove nut (47) and key washer.

o. Using arbor press and suitable adapter, push gearshaft assembly (36), with bearing (37) and spacer (38) installed, out of liner (40). Remove spacer (38) and, using bearing puller (LTCT675), remove bearing (37) from gearshaft assembly (36). Using bearing removal tool (LTCT231) and an arbor press, remove bearing (41) from liner (40).

6-12. DISASSEMBLY OF ACCESSORY DRIVE GEARBOX ASSEMBLY. (See figure 6-5.) Proceed as follows:

NOTE

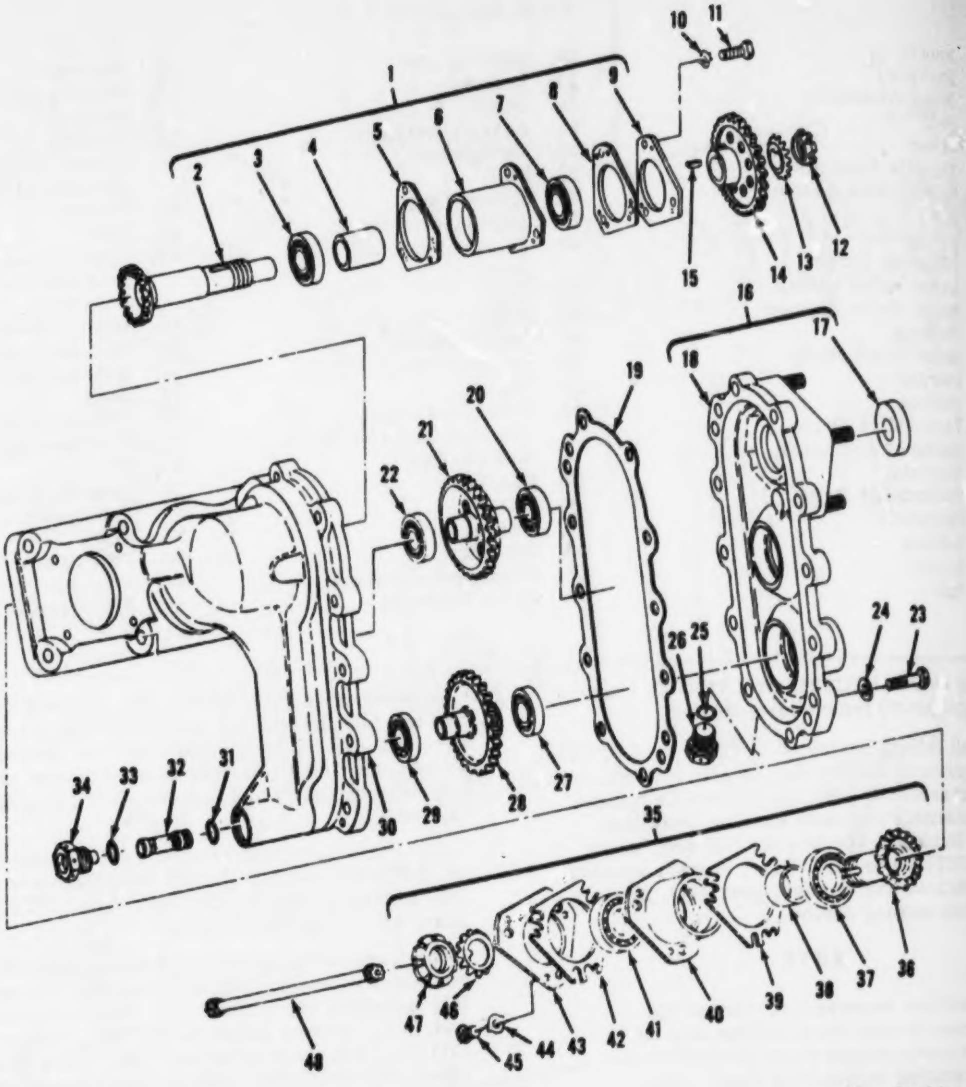
Following step a. applies to T53-L-15/701 engines which incorporate radial bearing housing (46).

a. Remove bolts (45) that secure housing (46) to accessory gearbox housing assembly. Remove housing (46) and packing (47).

b. Withdraw liner and gearshaft assembly (1, sheet 1) from accessory gearbox housing assembly (90, sheet 2). Remove packing (5, sheet 1).

c. Install holder assembly (LTCT3833) in bench-type vise.

d. Position liner and gearshaft assembly in holder assembly.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1. Bearing and Liner Assembly
2. Gearshaft Assembly
3. Bearing
4. Spacer
5. Shim
6. Liner
7. Bearing
8. Shim
9. Plate
10. Tabwasher
11. Screw
12. Spanner Nut
13. Key Washer
14. Gear
15. Key
16. Cover and Seal Assembly
17. Seal
18. Cover Assembly
19. Gasket
20. Bearing
21. Gear
22. Bearing
23. Bolt
24. Washer
25. Packing
26. Plug
27. Bearing
28. Gearshaft
29. Bearing
30. Housing and Liner Assembly
31. Packing
32. Filter Assembly
33. Packing
34. Plug
35. Bearing and Li Assembly
36. Gearshaft Ass
37. Bearing
38. Spacer
39. Shim
40. Liner
41. Bearing
42. Shim
43. Plate
44. Tabwasher
45. Screw
46. Key Washer
47. Nut
48. Shaft

Figure 6-4. Overspeed Governor and Tachometer Drive Assembly (T53-L-701) (DS and G Maintainance) - Exploded View

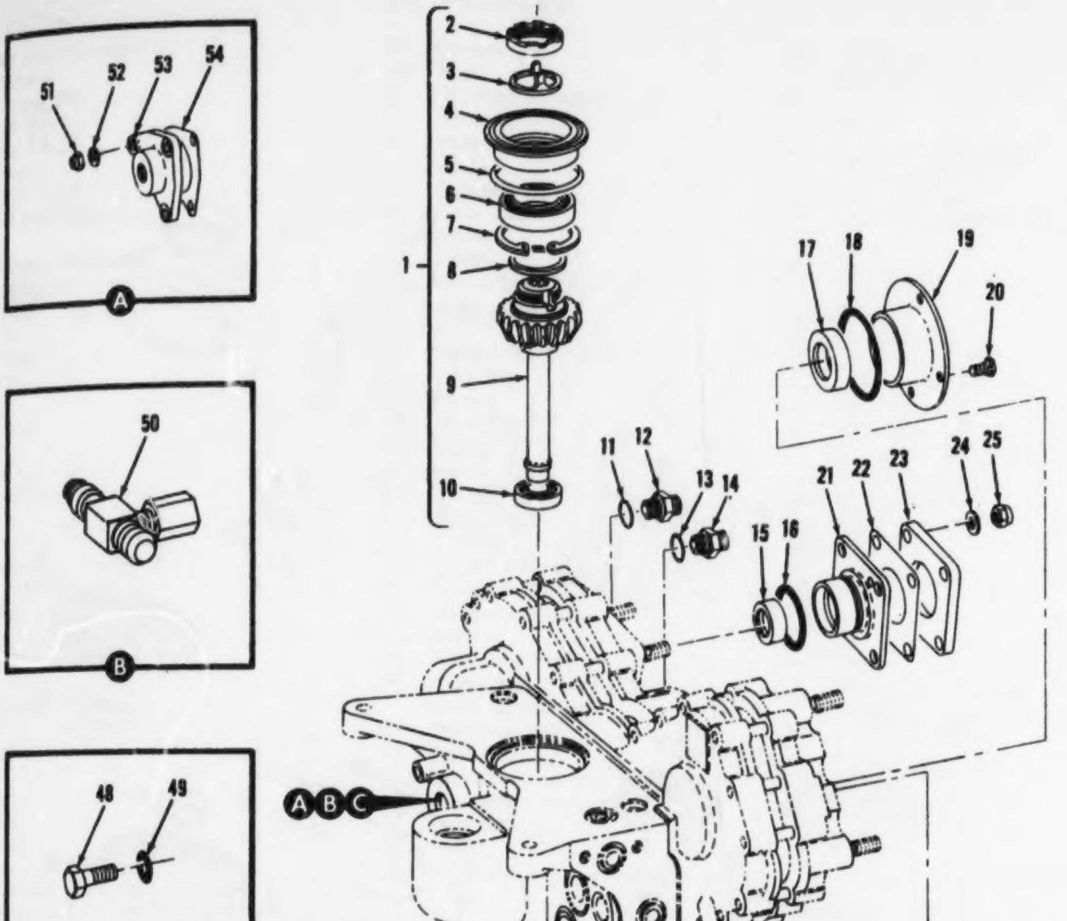
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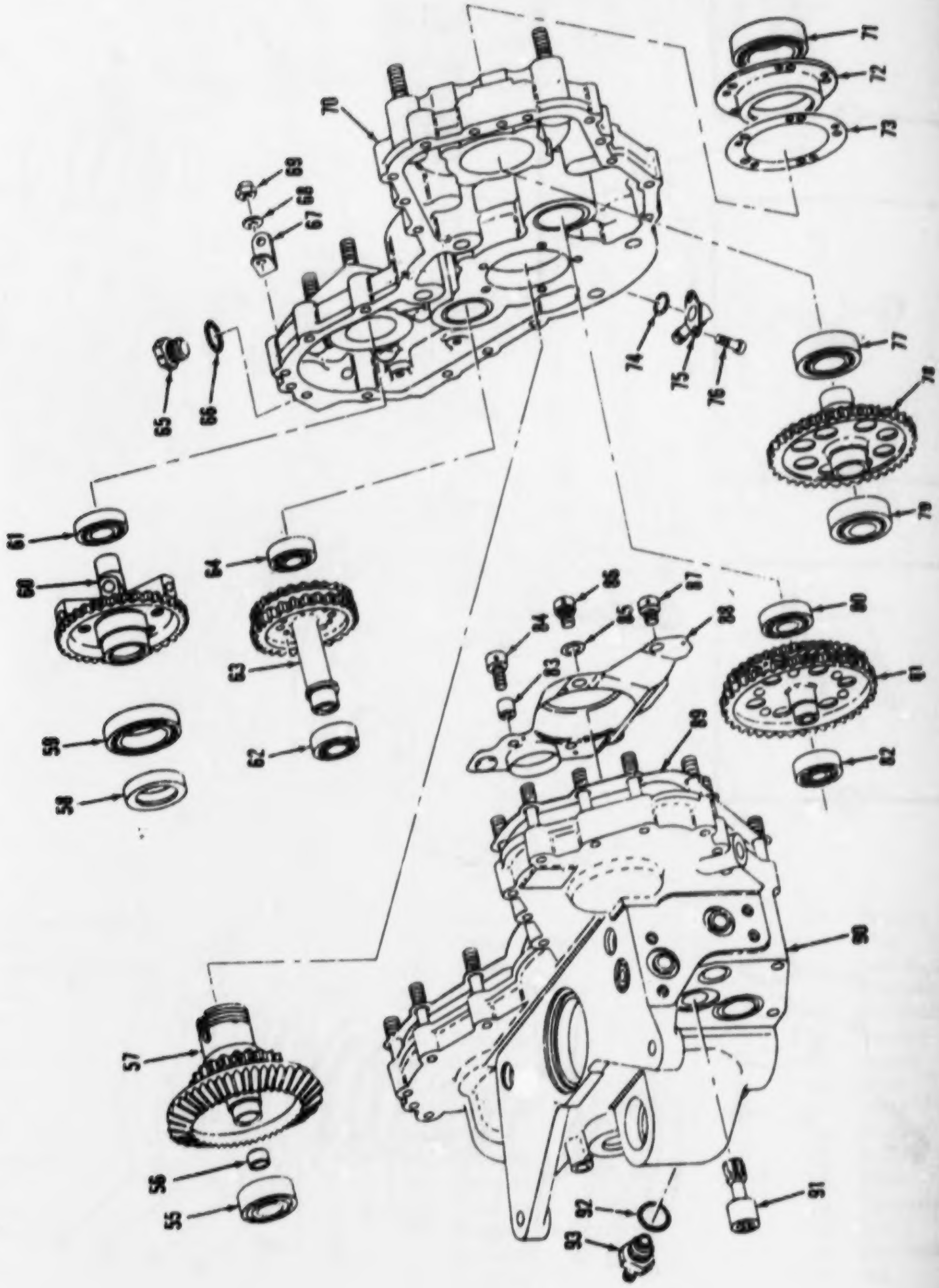
Figure 6-5. Accessory Drive Gearbox Assembly - Exploded View (Sheet 1 of 2)



Key to Figure 6-5.

Liner and Gearshaft Assembly
Retaining Nut
Key Washer
Pinion Liner
Packing
Ball Bearing
Retaining Ring
Shim
Gearshaft Assembly
Ball Bearing
Packing
Union
Packing
Union
Seal
Packing
Seal
Packing
Fuel Control Drive Liner
Bolt
Tachometer Drive Bearing Retainer
Gasket
Cover
Washer
Nut
Tabwasher
Bolt
Washer
Nut
Cover
Gasket
Support

33. Gasket
34. Bolt
35. Oil Seal Housing
36. Packing
37. Packing
38. Seal
39. Spanner Nut
40. Lock Cup
41. Spacer
42. Packing
43. Retaining Plate
44. Shim
45. Bolt
46. Radial Bearing Housing
47. Packing
48. Plug
49. Packing
50. Tee
51. Nut
52. Washer
53. Pad Cover
54. Gasket
55. Roller Bearing Outer Race
56. Roller Bearing Inner Race
57. Gear Assembly
58. Seal
59. Ball Bearing
60. Tachometer Drive Gearshaft Assembly
61. Ball Bearing
62. Ball Bearing
63. Oil-Air Separator Drive Gearshaft Assembly
64. Ball Bearing
65. Plug
66. Packing
67. Bracket
68. Washer
69. Nut
70. Accessory Gearbox Cover Assembly
71. Ball Bearing
72. Thrust Bearing Liner
73. Shim
74. Packing
75. Connector
76. Screw
77. Ball Bearing
78. Fuel Control Drive Gearshaft Assembly
79. Ball Bearing
80. Ball Bearing
81. Oil Pump Drive Gearshaft Assembly
82. Ball Bearing
83. Spacer
84. Bolt
85. Packing
86. Screw
87. Screw
88. Baffle
89. Gasket
90. Accessory Gearbox Housing Assembly
91. Oil Pump Drive Shaft Assembly
92. Packing
93. Chip Detector

Straighten tabs of key washer (3) and, using er wrench (LTCT107), remove retaining nut (2). ve key washer.

Remove assembly from holder assembly, and rt assembly on table of arbor press.

NOTE

To facilitate reassembly, record thickness of shim (8) in following step g.

Using long brass drift and arbor press, press aft assembly (9) from pinion liner (4). Remove (8).

Remove retaining ring (7). Using puller (LTCT remove ball bearing (6) from pinion liner (4).

Using puller (LTCT675), remove ball bearing om gearshaft assembly (9).

Remove nuts (29) and washers (28) that secure (30), gaskets (31 and 33), and support to ac- y gearbox cover assembly (70, sheet 2).

Remove bolts (34, sheet 1) that secure oil seal (35) to accessory gearbox cover assembly.

NOTE

In following step l., tighten both puller screws clockwise simultaneously to prevent oil seal housing from jamming.

l. Using two 10-32 puller screws, remove oil seal housing from accessory gearbox cover assembly. Remove packings (36 and 37). Using arbor press and seal removal tool (LTCT3648 or LTCT101), press seal (38) from housing.

m. Straighten rim of lock cup (40). Position holding fixture (LTCT115) on cover mounting pad studs. Check to ensure that tangs of holding fixture engage slots of spanner nut (39).

n. Insert splined tool (part of holding fixture) in holding fixture and engage with internal splines of gear assembly (57, sheet 2).

o. Using suitable wrench, turn splined tool clockwise to remove spanner nut (39, sheet 1) and lock cup (40). (See figure 6-6.) Discard lock cup.

p. Remove spacer (41, sheet 1, figure 6-5) and packing (42).

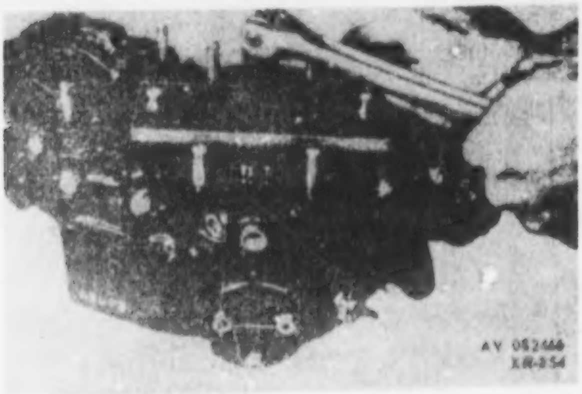


Figure 6-6. Removing Accessory Drive Gearbox Assembly Spanner Nut

q. Straighten tabs of tabwashers (26), and remove bolts (27) and tabwashers.

r. Remove retaining plate (43) and shim (44). Record thickness of shim (44), and secure to retaining plate.

s. Remove nuts (25), washers (24), cover (23), and gasket (22).

NOTE

> In following step t., tighten both puller screws simultaneously to prevent jamming.

t. Using two 10-32 puller screws, remove tachometer drive bearing retainer (21). Remove packing (16).

u. Using installing tool (LTCT501) and arbor press, remove seal (15) from tachometer drive flange.

v. Remove bolts (20) that secure fuel control drive liner (19) to accessory gearbox cover assembly.

NOTE

> In following step w., tighten both puller screws simultaneously to prevent jamming.

w. Using two 10-32 puller screws, remove fuel control drive liner. Remove packing (18).

x. Using installing tool (LTCT100) and arbor press, remove seal (17) from fuel control drive liner.

y. Remove unions (12 and 14) and packings (11 and 13).

z. Remove plug (65, sheet 2) and packing (66).

aa. Remove screws (76), connector (75), and packing (74).

ab. On T53-L-15 and -701 engines, remov (69), washers (68), and two brackets (67) that accessory gearbox cover assembly (70) to acce gearbox housing assembly (90).

NOTE

> In following step ac., if one side of cover assembly sticks, tap high side with soft-faced mallet. When gap of 1/2 inch between cover and housing is obtained, check to ensure that oil-air separator drive gearshaft assembly (63) and fuel control drive gearshaft assembly (78) are separated. Lightly tap cover assembly with soft-faced mallet to free stuck gearshaft assemblies.

ac. Secure puller (LTCT142) to accessory box cover assembly (70). Tighten handle slowly cover separates from housing. (See figure 6-

ad. Lift accessory gearbox cover assembly accessory gearbox housing assembly and remo puller. Remove gasket (89, sheet 2, figure 6-

ae. Turn accessory gearbox cover assemb and, using soft-faced mallet, tap thrust bearing (72) and ball bearing (71) out of cover assembly move shim (73) and record thickness. Using (LTCT916), remove bearing from liner.

af. Carefully lift tachometer drive gears assembly (60) out of accessory gearbox housing sembly (90). Using puller (LTCT2067), remov seal (58).

ag. Using puller (LTCT675), remove ball ings (59 and 61).

ah. Remove oil-air separator drive gear assembly (63).

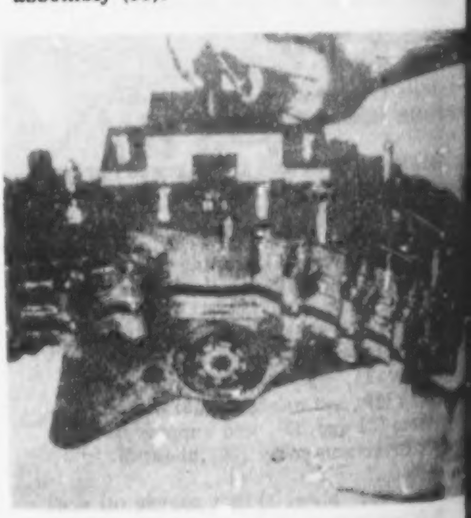


Figure 6-7. Removing Accessory Dr Gearbox Cover Assembly

ai. Using puller (LTCT675), remove ball bearings 3 and 64).

aj. Remove fuel control drive gearshaft assembly 8).

ak. Using puller (LTCT675), remove ball bearings 7 and 79).

al. Remove oil pump drive gearshaft assembly (81).

am. Using puller (LTCT675), remove ball bearing 0 and 82).

NOTE

When removing gear assembly in following step an., roller bearing outer race (55) will usually remain in accessory gearbox housing assembly (90). The outer race must be extracted and kept with roller bearing inner race (56) as a matched set.

an. Remove gear assembly (57).

ao. Using puller (LTCT675), remove roller bear- inner race (56) and retain with roller bearing ter race (55).

ap. Remove screws (87 and 86), bolts (84), and acers (83) that secure baffle (88). Remove baffle packing (85).

aq. Remove oil filter and oil pump, if installed.

ar. If installed, remove nut (51, sheet 1) and sher (52) that secure pad cover (53). Remove cover and gasket (54).

as. On engine model T53-L-15, remove tee (50).

at. On engine model T53-L-701, remove plug (48) packing (49).

au. Remove chip detector (93) and packing (92).

NOTE

If accessory gearbox is to be replaced, remove and retain following items for installation; rotary (oil) pump, chip detector, support, support gaskets, mounting nuts, bolts, and washers.

. DISASSEMBLY OF COMBUSTOR TURBINE EMBLY (T53-L-7/7A Engines). (See figures 6-8 6-9.) Proceed as follows:

NOTE

Disassemble the combustor turbine assembly only as far as necessary to correct visible damage or replace components.

. If installed, remove exhaust thermocouple ss. (Refer to paragraph 5-117.)

. If installed, remove main and starting fuel folds as a unit. (Refer to paragraph 5-32.)

a. Remove V-band coupling assembly as follows. (See figure 6-8.)

NOTE

If V-band couplings (1 and 6) are installed, remove as outlined in following step (1). If V-band couplings (10 and 7) are installed, remove as outlined in following step (2).

(1) Remove nuts (5), spacers (4 and 3), and bolts (2) that secure V-band couplings (1 and 6) together. Separate couplings from diffuser support cone and remove V-band couplings.

(2) Remove nuts (8) and spacers (9) that secure V-band couplings (10 and 7) together. Separate couplings from diffuser support cone and remove V-band couplings.

b. Remove support cone (14, figure 6-9).

CAUTION

In following step c., do not twist or turn oil nozzle during removal.

c. Unscrew power turbine oil strainer housing (7), and remove housing, power turbine oil strainer (9), and oil nozzle (10). Unscrew strainer from oil nozzle. Remove packings (8 and 11).

d. Remove adapter (12) from power turbine tube (4). Remove packing (13).

e. Remove power turbine oil tube connector (17). Remove packing (16).

f. Remove plugs (15).

g. Remove adapter nuts (6) that secure fire shield (5) to fuel vaporizers.

gA. Remove igniter plugs. (Refer to paragraph 5-137.)

CAUTION

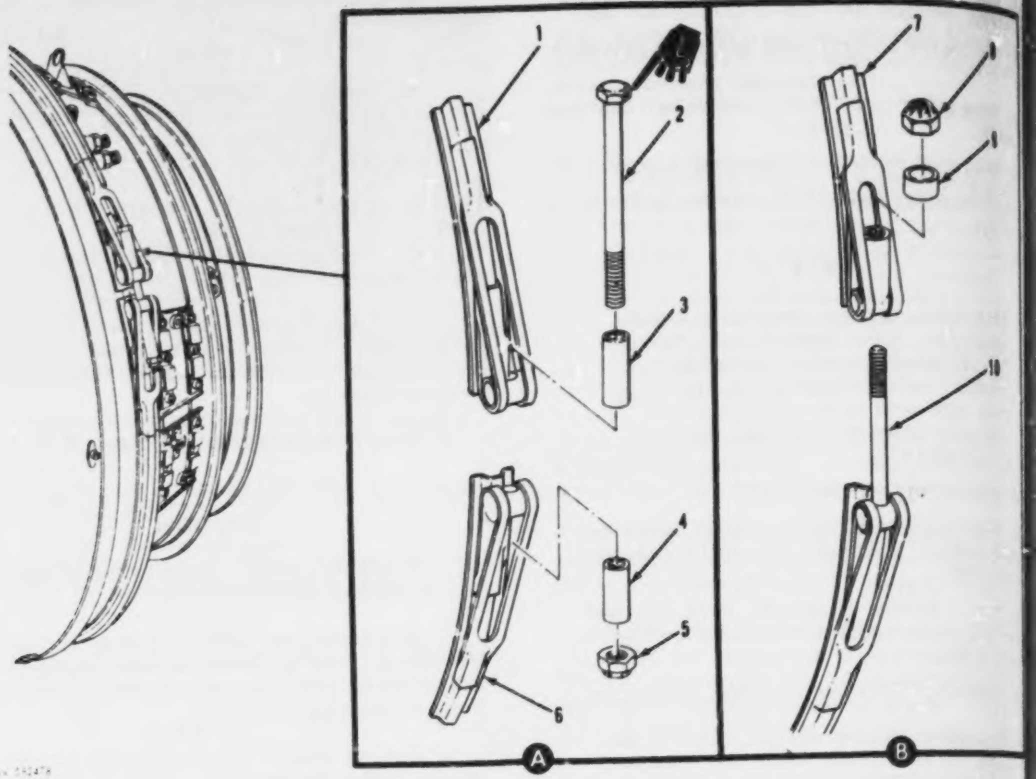
Do not damage threads of fuel vaporizers when removing fire shield in following step h.

h. Remove fire shield. Cap fuel vaporizers to protect threads.

i. Remove two power turbine tubes (4).

j. Check clearance between second stage power turbine blades and second stage nozzle and cylinder assembly. (Refer to paragraph 3-46.)

k. Remove special bolts (18, figure 6-9) that secure second stage turbine support assembly (3) to combustion chamber assembly (2). Discard bolts. Remove second stage turbine support and set aside.



1. V-Band Coupling
2. Bolt
3. Spacer
4. Spacer
5. Nut
6. V-Band Coupling
7. V-Band Coupling
8. Nut
9. Spacer
10. V-Band Coupling

Figure 6-8. V-Band Coupling Assembly and Attaching Parts

l. Remove power turbine nozzle and cylinder assembly (1) from combustion chamber assembly (2) by removing screws (19). Discard screws.

6-14. DISASSEMBLY OF COMBUSTION CHAMBER ASSEMBLY (T53-L-7/7A Engines). (See figure 6-10.) Disassemble the combustion chamber assembly only as far as necessary to correct visible damage or replace components. Proceed as follows:

a. Remove and disassemble combustion turbine assembly. (Refer to paragraph 3-44 and 6-13.)

b. (Deleted)

c. Using wrench (LTCT57) on each of fuel vaporizer locking nuts (4), engage pins of tool with holes in locking nut and loosen each nut.

d. Position combustion chamber on its side. Support each fuel vaporizer (1) and remove locking nut that secures each fuel vaporizer to combustion chamber liner assembly (2) and combustion chamber housing (3).

e. Remove, cap, and index vaporizers.

f. Place vaporizers in suitable rack.

NOTE

In following step g., on liner assemblies with the three point suspension, remove washers (7) from the studs at the 1-, 5-, and 8-o'clock positions.

g. Remove nuts (6) that secure combustion liner assembly to combustion chamber housi move liner assembly.

6-15. DISASSEMBLY OF FUEL VAPORIZER SEMBLY (T53-L-7/7A Engines). (See figure Proceed as follows:

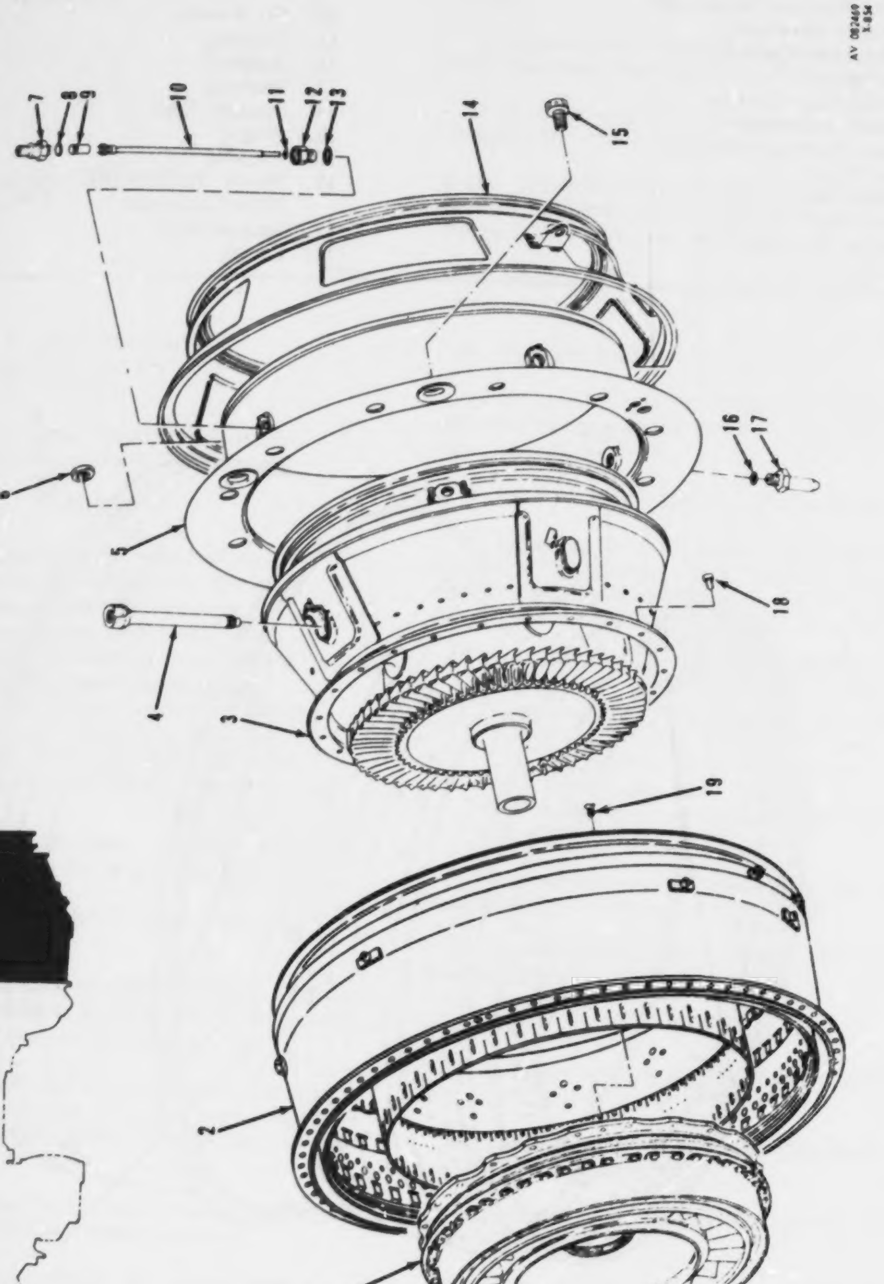

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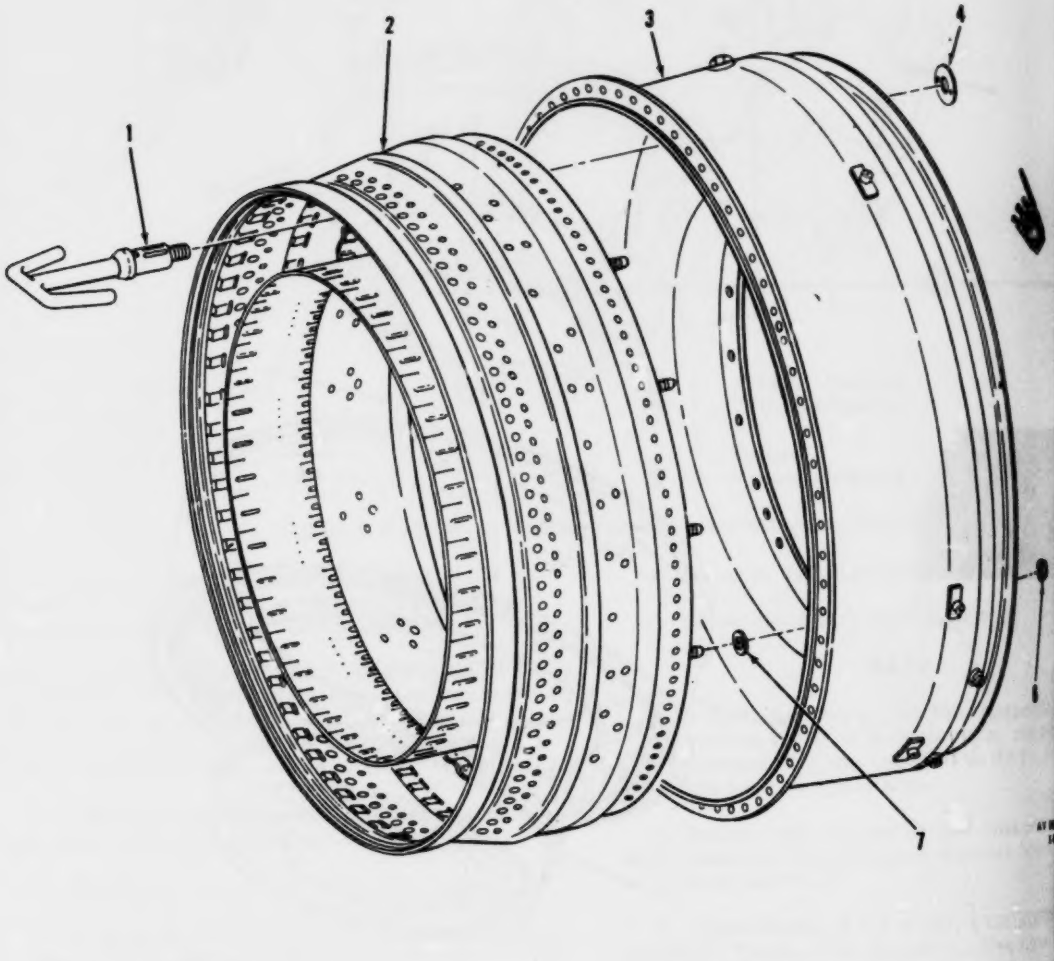
Figure 6-9. Combustor Turbine Assembly (T53-L-7/7A) - Exploded View

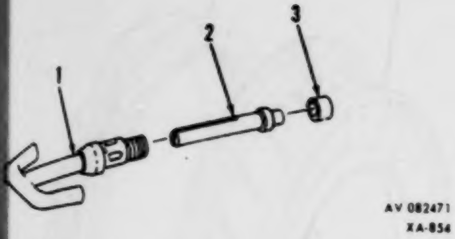
Key to Figure 6-9.

1. Power Turbine Nozzle and Cylinder Assembly
2. Combustion Chamber Assembly
3. Second Stage Turbine Support Assembly
4. ■ Power Turbine Oil Tube
5. Fire Shield
6. Adapter Nut
7. Power Turbine Oil Strainer Housing
8. Packing
9. Power Turbine Oil Strainer
10. Oil Nozzle
11. Packing
12. Adapter
13. Packing
14. Support Cone
15. Plug
16. Packing
17. Power Turbine Oil Tube Connector
18. Special Bolt
19. Screw



1. Fuel Vaporizer Assembly
2. Combustion Chamber Liner Assembly
3. Combustion Chamber Housing
4. Locking Nut
5. ■ (Deleted)
6. Nut
7. Washer

Figure 6-10. Combustion Chamber Assembly (T53-L-7/7A) - Exploded View



1. Fuel Vaporizer
2. Fuel Divider
3. Bushing

Figure 6-11. Fuel Vaporizer Assembly (T53-L-7/7A) - Exploded View

NOTE

It is not necessary to remove fuel vaporizer assemblies for inspection. However, if one vaporizer assembly requires removal for cleaning or closer evaluation of damage, all fuel vaporizer assemblies shall be removed, disassembled, and cleaned prior to further inspection. Ensure that threaded end of vaporizer is capped during cleaning and inspection to prevent entry of contaminants into fuel divider.

Using number 8-32 screw, remove bushing (3) l divider (2) from fuel vaporizer (1).

Remove bushing (3) from fuel divider (2). Disshing.

DISASSEMBLY OF POWER TURBINE NOZZLE YLINDER ASSEMBLY (T53-L-7/7A Engines). ure 6-12.) Proceed as follows:

emove bolts (5) and tabwashers (6) that secure nozzle seal retainer (4) and second stage tur- zzle (7) to power turbine cylinder (8). Discard d tabwashers.

parate turbine nozzle seal retainer assembly cond stage turbine nozzle assembly.

emove special lockwire (9), power turbine sealing ring (1), turbine seal segment (2), ine seal spring (3) from turbine nozzle seal .

ISASSEMBLY OF SECOND STAGE TURBINE T ASSEMBLY (T53-L-7/7A Engines). (See -13.) Proceed as follows:

ace second stage turbine support assembly in fixture (LTCT40).

b. Remove screws (5) that secure second stage turbine rotor assembly (1) to exhaust diffuser assembly (4).

c. Using puller (LTCT4800), separate turbine rotor assembly from exhaust diffuser assembly.

d. Remove seal (2) or packing (3). Discard packing (3); seal (2) is reusable.

6-18. DISASSEMBLY OF SECOND STAGE TURBINE ROTOR ASSEMBLY (T53-L-7/7A Engines). (See figure 6-14.) Proceed as follows:

a. Place second stage turbine rotor assembly in holding fixture (LTCT40).

b. Straighten tabs of lock cup (17).

c. Position wrench (LTCT222) on spanner nut (16) and remove spanner nut and lock cup. Discard lock cup. (See figure 6-15.)

d. Remove rear impeller (18, figure 6-14).

e. Install puller (LTCT4800, LTCT2023 or LTCT 73) on bearing housing (15) and remove housing assembly from second stage turbine rotor (1). (See figure 6-16.) Remove puller from housing.

NOTE

Use care when removing bearing in following step f. The bearing is a split-type and must be removed as a unit, with inner races held together. If necessary invert bearing housing and tap out bearing.

f. Remove screws (19, figure 6-14) and rear retaining ring (20) and lift out No. 4 bearing (21).

g. Remove shim (22) and spacer (23) from inside bearing housing.

NOTE

In following step h., No. 3 bearing outer race (14) remains in housing.

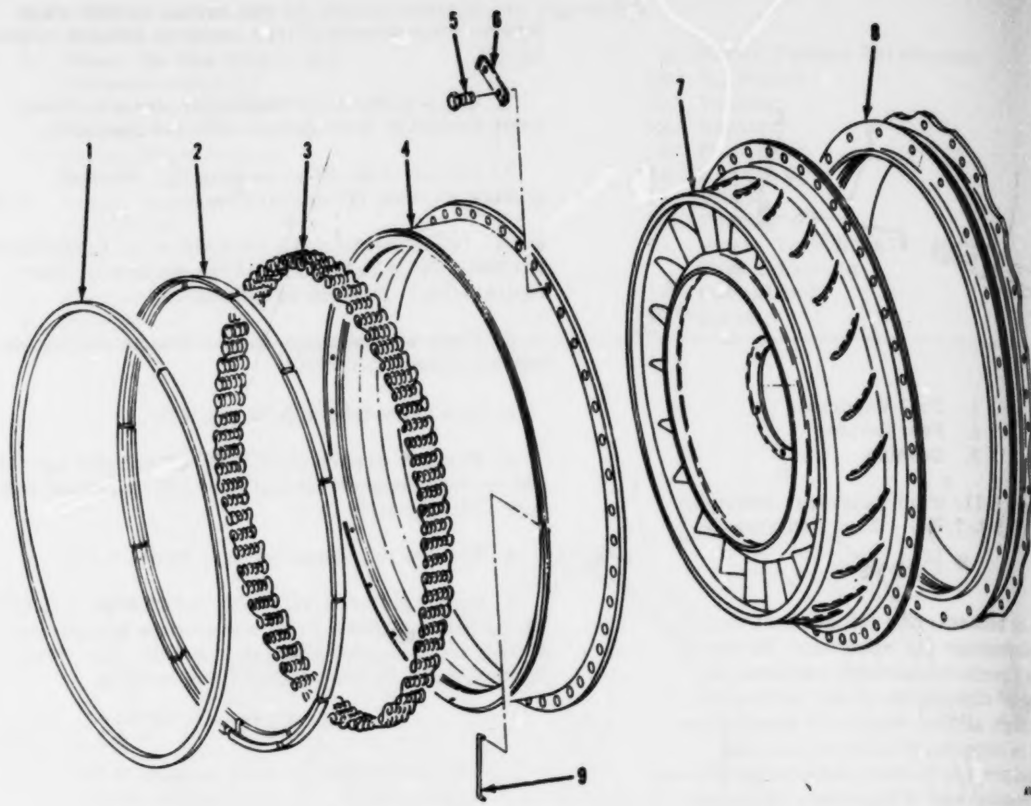
h. Carefully remove No. 3 bearing inner race and rollers (24) and shim (25).

i. Invert bearing housing and remove bolts (3) and deflector (2).

j. Remove seal and housing assembly (4) and forward impeller (10).

NOTE

Be certain bearing retainer is not cocked and is bottomed against outer race in following step k.



1. Power Turbine Cylinder Sealing Ring
2. Turbine Seal Segment
3. Turbine Seal Spring
4. Turbine Nozzle Seal Retainer
5. Bolt
6. Tabwasher
7. Second Stage Turbine Nozzle
8. Power Turbine Cylinder
9. Special Lockwire

Figure 6-12. Power Turbine Nozzle and Cylinder Assembly (T53-L-7/7A) - Exploded View

k. If seal housing is to be replaced, record distance from mating surface flange to forward end of replacement seal housing (dimension A). Record distance from bearing housing rear flange to bearing retainer (dimension B).

l. Subtract dimension B from dimension A to obtain dimension C. Subtract 0.008 to 0.010 inch from dimension C to obtain shim thickness required to provide pinch fit on bearing outer race as given in table 11-4, reference number 60.

m. Remove seal (11, figure 6-14) or packing (26), screw (12) if installed, and forward retaining ring (13).

NOTE

Record thickness of shims (9 and 25) in following step n. for reassembly and attach shim to forward impeller (10) with lockwire.

n. Remove shim (9) from second stage turb rotor shaft.

NOTE

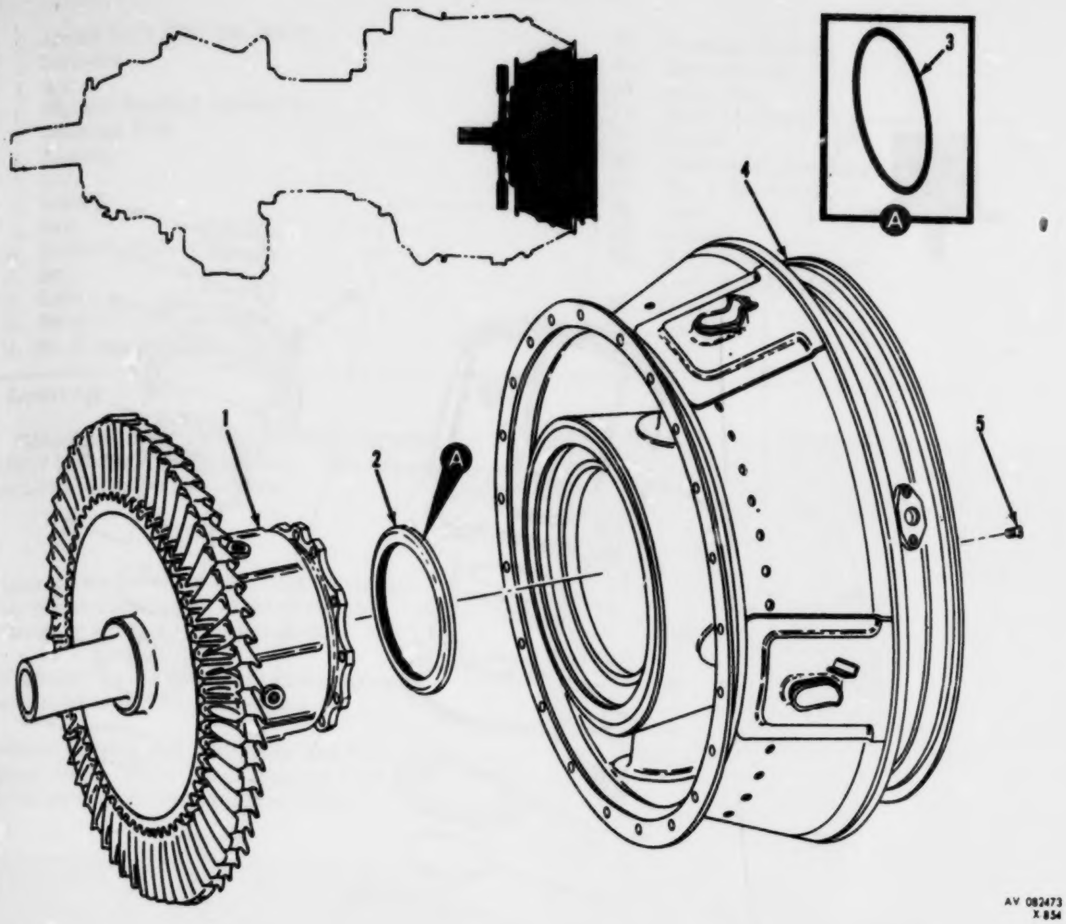
Position drift against outer race in following step o. at points where housing cutouts reveal race.

o. Using a hammer and brass drift, tap No. bearing outer race (14) from housing.

p. If seal (7) is to be replaced, proceed as (Refer to paragraph 7-49 for replacement co

(1) Remove retaining ring (5, figure 6- housing (8).

(2) Prepare installing and removing tool 482) by installing spacer (LTCT 4833, detail of 482) on base (LTCT2637, detail of LTCT482) stud (LTCT2639, detail of LTCT482).



1. Second Stage Turbine Rotor Assembly
2. Seal
3. Packing
4. Exhaust Diffuser Assembly
5. Screw

Figure 6-13. Second Stage Turbine Support Assembly (T53-L-7/7A) - Exploded View

(3) Position seal housing, forward face down, pacer and base.

(4) Install removal disc (LTCT4334, detail of CT462) on seal.

NOTE

In following step (5), the flat washer and speed handle are parts of seal removal fixture.

(5) Install flat washer (LTCT9023-13, detail TCT462) and handle (LTCT2667, detail of LTCT) on stud.

NOTE

In following step (6), position removal disc to seat firmly on rim of seal and not on seal housing.

(6) Position handle, with removal disc attached, on base.

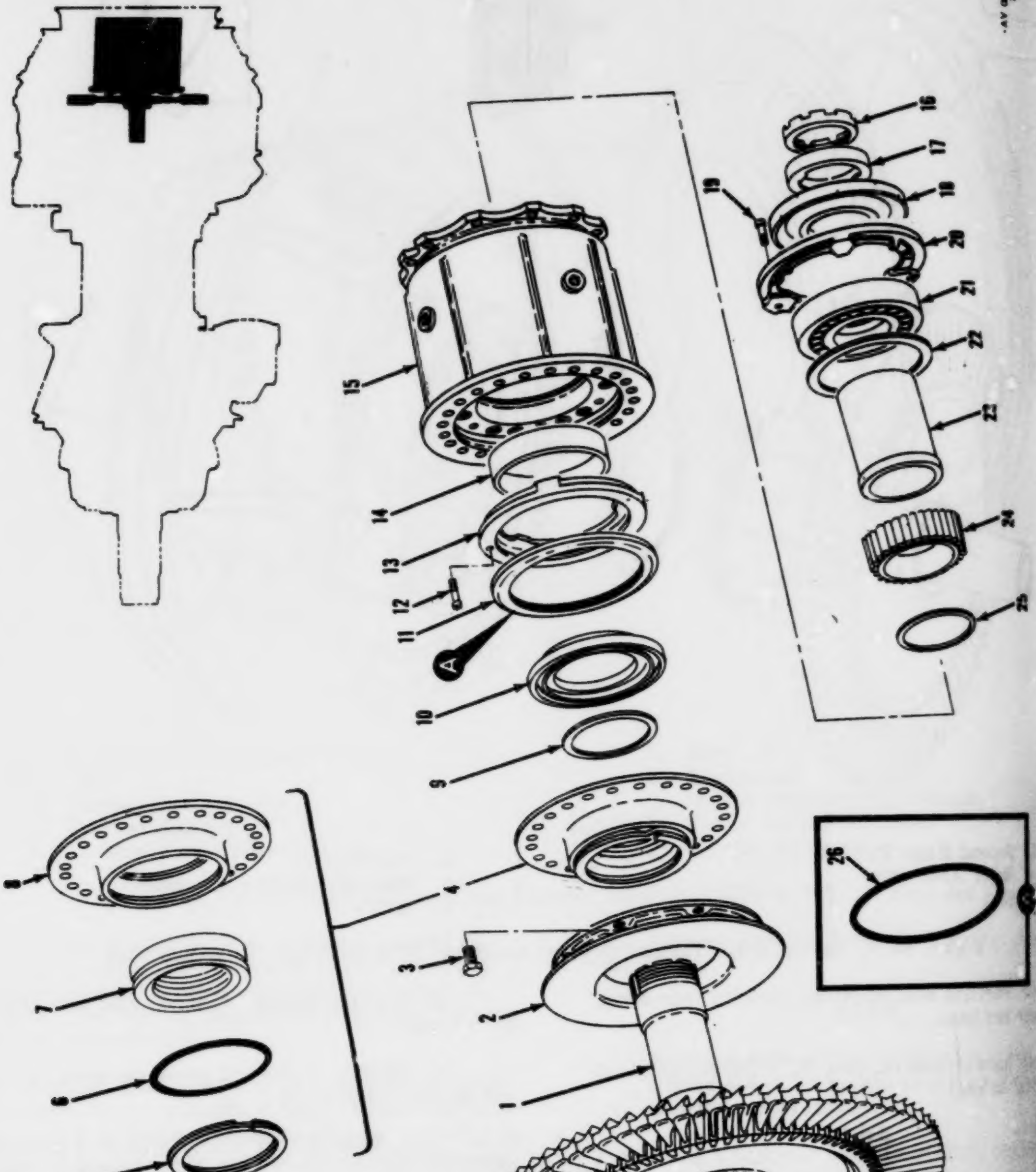
(7) Tighten handle and press out seal. Remove and discard packing (6).

6-19. DISASSEMBLY OF FIRST STAGE TURBINE NOZZLE ASSEMBLY (T53-L-7/7A Engines). (See figure 6-17.) Proceed as follows.

NOTE

Do not disassemble first stage turbine nozzle assembly except to correct visible damage or to replace parts.

a. Remove and discard screws (5) that secure first stage turbine nozzle flange (3) to first stage turbine nozzle (2).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Key to Figure 6-14.

1. Second Stage Turbine Rotor
2. Deflector
3. Bolt
4. Seal and Housing Assembly
5. Retaining Ring
6. Packing
7. Seal
8. Housing
9. Shim
10. Forward Impeller
11. Seal
12. Screw
13. Forward Retaining Ring
14. No. 3 Bearing Outer Race
15. Bearing Housing
16. Spanner Nut
17. Lock Cup
18. Rear Impeller
19. Screw
20. Rear Retaining Ring
21. No. 4 Bearing
22. Shim
23. Spacer
24. No. 3 Bearing Inner Race and Rollers
25. Shim
26. Packing

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b. Remove nozzle flange.

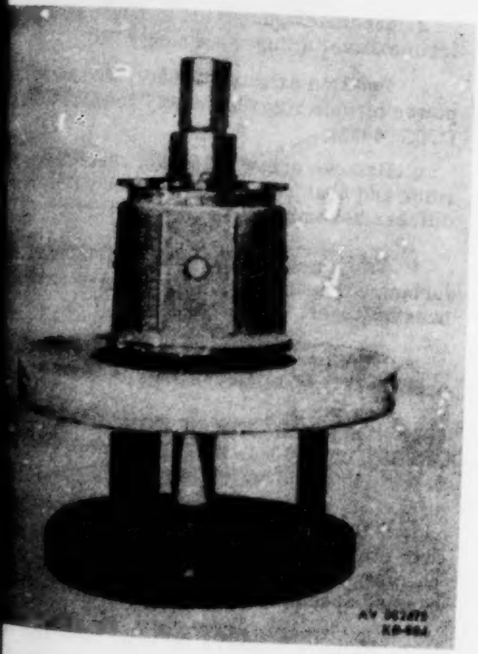
0. DISASSEMBLY OF COMBUSTOR TURBINE EMBLY (T53-L-15/701 Engines). (See figures and 6-16.) Proceed as follows.

NOTE

Disassemble the combustor turbine assembly only as required to correct visible damage or to replace components.

If installed, remove exhaust thermocouple ess. (Refer to paragraph 5-119.)

Remove starting fuel manifolds and disconnect divider hoses. (Refer to paragraph 5-34 and .) Cap ports on divider and manifolds.



6-15. Removal and Installation of Bearing Housing Assembly Spanner Nut

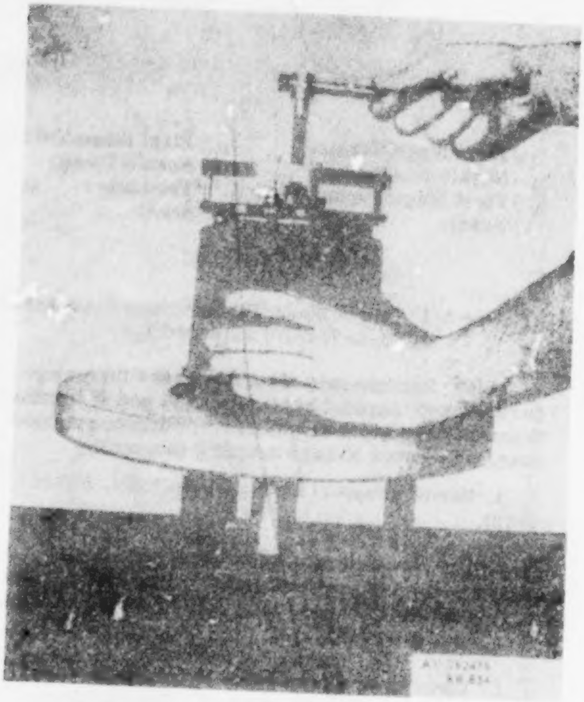


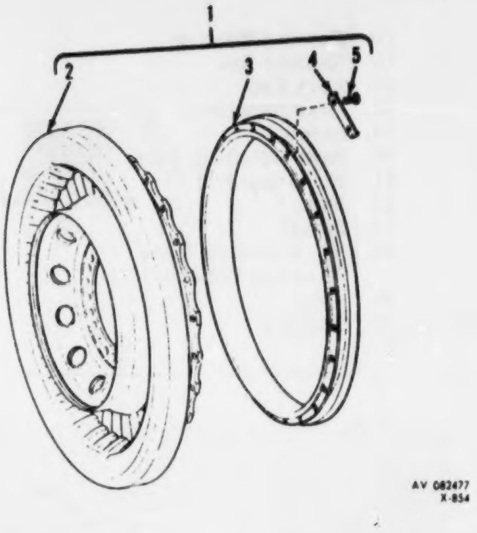
Figure 6-16. Removing Power Turbine Bearing Housing

c. Remove V-band coupling assembly (figure 6-8) as follows.

NOTE

If V-band coupling assemblies (1 and 6) are installed, remove as outlined in following step (1). If V-band coupling assemblies (10 and 7) are installed, remove as outlined in following step (2).

(1) Remove nuts (5), spacers (4 and 3), and bolts (2) that secure V-band coupling assemblies (1 and 6) together. Separate coupling assemblies from diffuser support cone and remove V-band coupling assemblies.



1. First Stage Turbine Nozzle Assembly
2. First Stage Turbine Nozzle
3. First Stage Turbine Nozzle Flange
4. Tabwasher
5. Screw

Figure 6-17. First Stage Turbine Nozzle Assembly (T53-L-7/7A) - Exploded View

(2) Remove nuts (8) and spacers (9) that secure V-band coupling assemblies (10 and 7) together. Separate coupling assemblies from diffuser support cone and remove V-band coupling assemblies.

d. Remove support cone assembly (24, figure 6-18).

e. Unscrew and remove oil strainer housing adapter (17) from power turbine oil tube (20) at top of exhaust diffuser assembly (33). Remove packing (21) and strainer (18).

f. Unscrew and remove connector from power turbine oil tube (20) at bottom of exhaust diffuser. Remove packing (32).

g. If installed, remove starting fuel nozzles and igniter plugs. (Refer to paragraphs 5-36 and 5-139.)

CAUTION

In following step h., use care when removing manifolds to prevent damage to nozzles. Cap fuel inlet ports and place in plastic bags.

h. Remove bolts (25, **figure 6-18) that secure fuel** manifold assemblies (16 and 26) **to rear of combustion** chamber assembly (14). **Carefully remove manifolds** from combustion chamber housing. **Remove seals (27)** from fuel nozzles. **Remove screws (29) that secure** sealing gaskets (28) to fuel manifold **assembly (16).** Remove gaskets.

i. Remove fire shield (30) from exhaust

j. Remove two power turbine oil tubes (20) exhaust diffuser struts.

k. Straighten locking plates (3 and 22) and bolts (2 and 23). Remove locking plates.

l. Withdraw pins (9) from spacer (10).

m. Remove first stage power turbine from power turbine rotor and remove spacer Record thickness of spacer for reassembly.

n. Straighten tabs of locking plates (5) and and discard bolts (4). Remove locking plates. ing marking pencil (item 72, table 2-2), alignment of sealing flange (6), first stage bine rotor (7), power turbine spacer (8), and stage power turbine rotor.

o. Remove sealing flange (6) from face of stage power turbine rotor.

p. Using mechanical puller (LTCT4680), (LTCT4682, detail of LTCT4680) extended counterclockwise as viewed from handle end, first stage power turbine rotor (7) and power spacer (8) as a unit. Remove gasket (36).

q. Turn rotor and spacer over and, using (LTCT4680) with arms retracted and hooks remove power turbine spacer (8) from rotor.

r. Remove second stage turbine nozzle (12), and spacer (13). Record thickness of reassembly.

s. Separate combustion chamber assembly from exhaust diffuser assembly (33).

t. Position exhaust diffuser, with second power turbine rotor assembly down, in holding (LTCT4553).

u. Remove screws (19) that secure power rotor and bearing housing assembly (35) to diffuser assembly.

v. Using mechanical puller (LTCT4800), turbine rotor and bearing housing assembly haust diffuser.

w. Remove seal (34) and packing (37). packing (37); seal (34) is reusable.

6-21. DISASSEMBLY OF COMBUSTION ASSEMBLY (T53-L-15/701 Engines). (See 6-19.) Proceed as follows:

a. Straighten tabs on key washers (3) and nuts (4) and key washers that secure chamber liner assembly (8) to combustion housing assembly (7). Remove liner

b. Remove washers (9) from three liner bly studs.

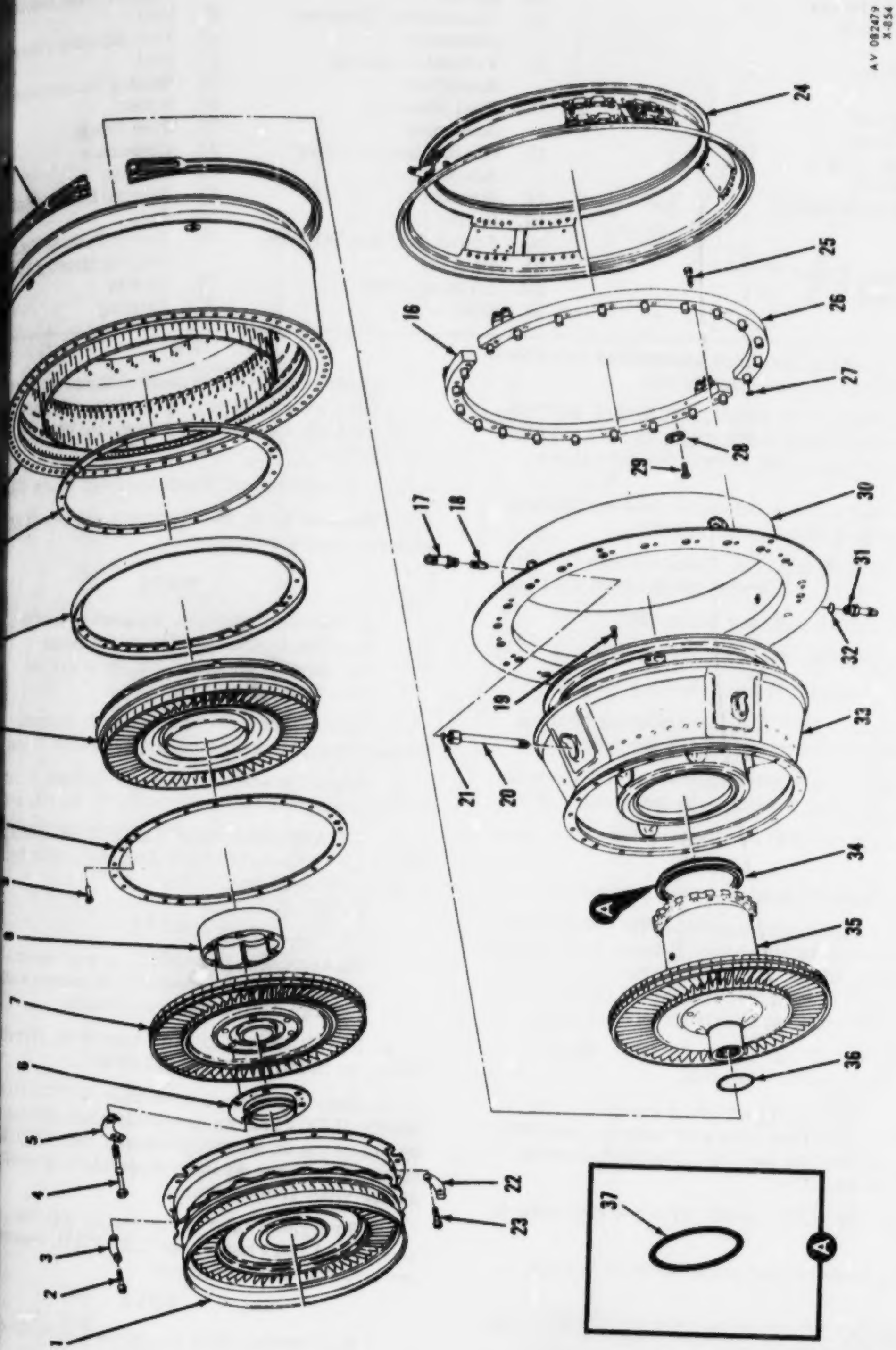

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Figure 6-18. Combustor Turbine Assembly (T53-L-15/701) - Exploded View

Key to Figure 6-18.

1. First Stage Power Turbine Nozzle
2. Bolt
3. Locking Plate
4. Bolt
5. Locking Plate
6. Sealing Flange
7. First Stage Power Turbine Rotor
8. Power Turbine Spacer
9. Pin
10. Spacer
11. Second Stage Power Turbine Nozzle
12. Ring
13. Spacer
14. Combustion Chamber Assembly
15. V-Band Coupling Assembly
16. Fuel Manifold Assembly
17. Oil Strainer Housing Adapter
18. Strainer
19. Screw
20. Power Turbine Oil Tube
21. Packing
22. Locking Plate
23. Bolt
24. Support Cone Ass
25. Bolt
26. Fuel Manifold Ass
27. Seal
28. Sealing Gasket (A
29. Screw
30. Fire Shield
31. Connector
32. Packing
33. Exhaust Diffuser A
34. Seal
35. Power Turbine Ro Bearing Housing A
36. Gasket
37. Packing

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c. Remove starting fuel hose assemblies and check filter valve. (Refer to paragraph 5-15.)

6-22. DISASSEMBLY OF POWER TURBINE ROTOR AND BEARING HOUSING ASSEMBLY (T53-L-15/701 Engines). (See figure 6-20.) Proceed as follows:

a. Place power turbine rotor and bearing housing assembly in holding fixture (LTCT4553).

b. Straighten lock cup (18). Using wrench (LTCT 915), remove nut (17). Remove and discard lock cup.

c. Remove screws (19) and cover (20).

d. Remove impeller (21) and washer (22).

e. Remove screws (23) and retaining ring (24).

f. Install puller (LTCT4800) on bearing housing (27). Pull bearing housing from turbine rotor (2).

g. Using hammer and suitable brass drift, tap bearing (25) out of bearing housing. Remove shim (26).

h. Remove spacer (28) and bearing (29) from bearing housing.

i. Remove bolts (5) and deflector support (6).

j. Remove seal housing assembly (11) and impeller (13). Remove retaining ring (7) from seal housing assembly. Using arbor press and removing and installing tool (LTCT4947), press seal (9) out of seal housing. Remove packing (10) from seal housing.

k. Remove tube (31) and packing (30). Remove packing (32) from bearing housing.

l. Remove screws (15) and ring assembly (16). Remove packing (3) from ring assembly or seal (12) from groove on bearing housing. Discard packing (3); seal (12) is reusable.

m. Using puller (LTCT4846), remove seal ring (8) and ring (14).

n. Remove bolts (1) and plate (4) from turbine rotor disc.

6-23. DISASSEMBLY OF EXHAUST DIFFUSER SUPPORT CONE ASSEMBLY (T53-L-15/701 Engines). (See figure 6-21.) Proceed as follows.

NOTE

Disassemble the exhaust diffuser support cone assembly only as required to correct visible damage or replace compo- ents.

a. Cut and remove lockwire from screw (1

b. Remove bolts that secure retainers (2 a Remove retainers.

NOTE

In following step c., support assembly must be tagged and flanges indexed for support location. Supports are not interchangeable.

c. Remove pins (3) from support assembly Remove support assembly from flanges (6 and

d. Repeat preceding steps a. through c. fo maining support assemblies (8, 9, 10, 11, a

6-24. DISASSEMBLY OF REDUCTION GEAR SEMBLY (T53-L-7/7A/15 Engines). (See fig 6-22.) Proceed as follows.

NOTE

Disassemble the reduction gear assemb only as far as necessary to correct vis damage or replace components.

a. Install reduction gear assembly, prope down, in holding fixture (LTCT247).

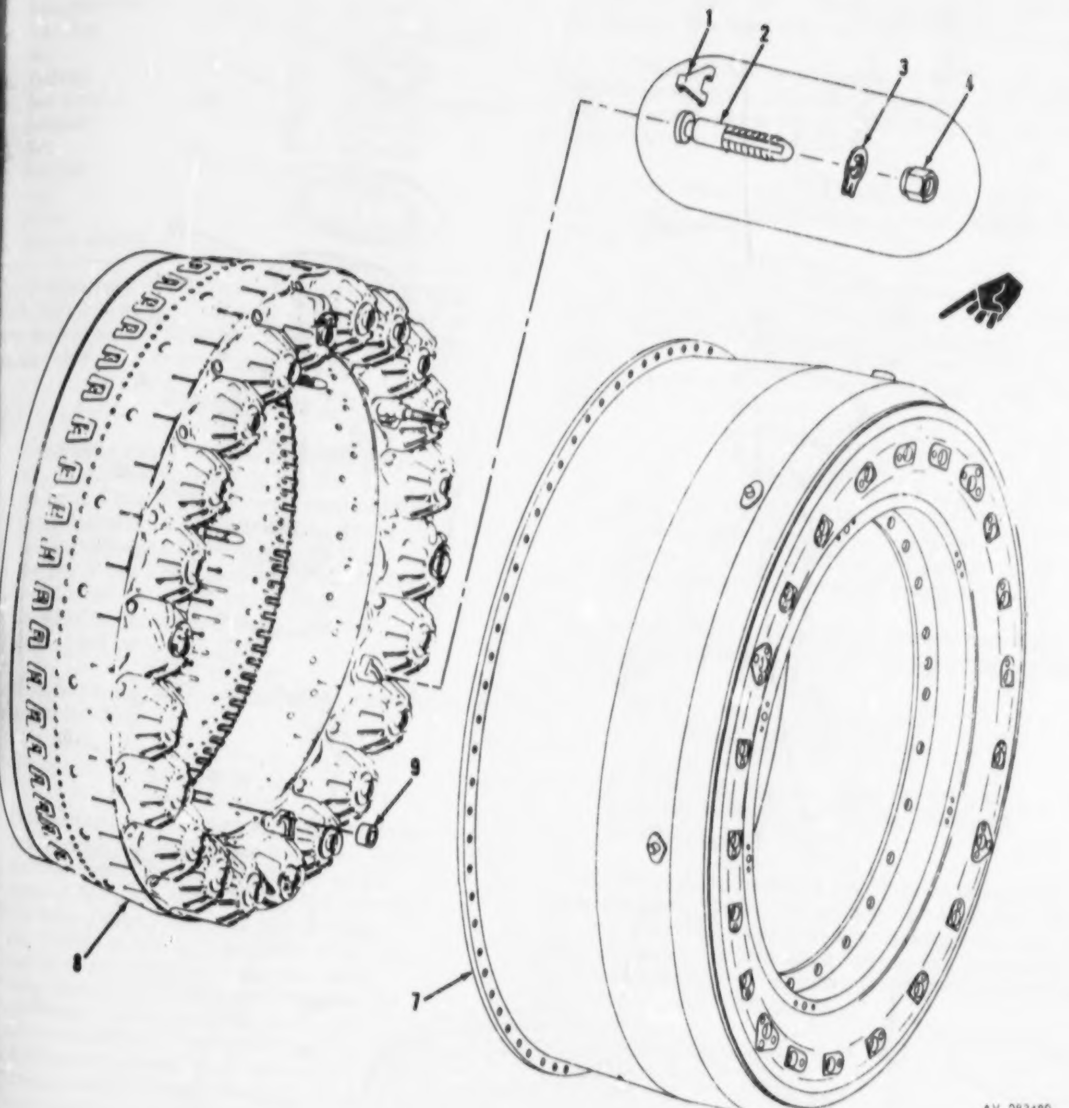
b. Position wrench assembly (LTCT2019) handle (LTCT182) on propeller shaft (30) and by screwing on thread protector cap, AN5012 Brace or secure wrench assembly to preve peller shaft from turning.

c. Straighten tabs of tabwasher (44); the socket and pilot assembly (LTCT557), remo ner nut (43) and tabwasher.

NOTE

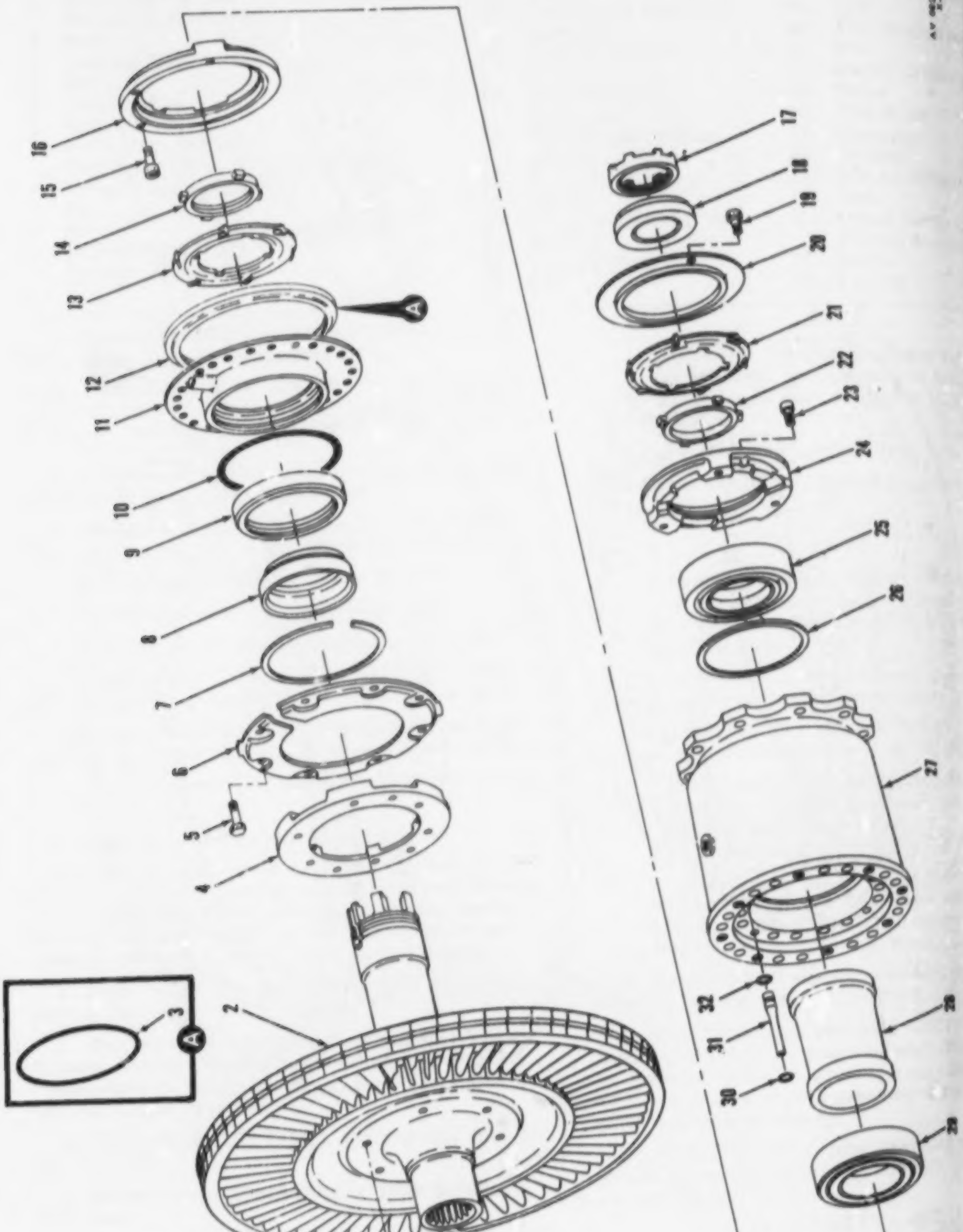
In following step d., record thickness of bearing pinch shim (46) and attach to washer (45) with lockwire.

d. Remove washer (45) and bearing pinch



1. Clip
2. Stud
3. Key Washer
4. Nut
5. (Deleted)
6. (Deleted)
7. Combustion Chamber Housing Assembly
8. Combustion Chamber Liner Assembly
9. Washer

Figure 6-19. Combustion Chamber Assembly (T53-L-15/701) - Exploded View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Key to Figure 6-20.

1. Bolt
2. Turbine Rotor
3. Packing
4. Plate
5. Bolt
6. Deflector Support
7. Retaining Ring
8. Seal Ring
9. Seal
10. Packing
11. Seal Housing Assembly
12. Seal
13. Impeller
14. Ring
15. Screw
16. Ring Assembly
17. Nut
18. Lock Cup
19. Screw
20. Cover
21. Impeller
22. Washer
23. Screw
24. Retaining Ring
25. Bearing
26. Shim
27. Bearing Housing
28. Spacer
29. Bearing
30. Packing
31. Tube
32. Packing

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e. Position legs of mechanical puller (LTCT186 LTCT2013) in slots of carrier (50) and under proller shaft rear bearing inner race (47). Remove peller shaft rear bearing inner race.

NOTE

In following step f. to facilitate reassembly, record the location of the No. 1, No. 2, and No. 3 planet gear assemblies in the carrier. Viewed from the rear, No. 1 planet gear assembly is at the top; No. 2 and 3 are located in clockwise order. The bottom of the carrier is identified by matchmarks on both the carrier and propeller shaft.

. If sealing rings (48) are damaged, remove from s in carrier (50).

CAUTION

In following step g., turn jackscrews evenly to prevent cocking of the carrier. Do not drop bearing outer races (51) of the three aft bearings when lifting the carrier. The outer races of the roller bearings may remain in the rear carrier when the carrier is removed. To prevent accidental interchanging of parts remove the outer races, using suitable drift and soft-faced mallet, if necessary. Tag for identification (planet gear assembly, part number, and/or serial number), and place in suitable container.

Remove bolts (49) and, using three 1/4-28 jack-s, remove carrier (50).

NOTE

In following step h., the planet gear assembly will have painted lines alongside three sets of teeth. The middle of the three marked teeth must be between the timing marks on the internal gear to be properly timed. The timing phase occurs every four revolutions of the front bearing support assembly. If the assembly is not correctly timed, record in the engine log.

h. Check timing of planet gearshaft (32) and internal ring gear (34). Rotate bearing support (9) as necessary to align index marks. (See figure 6-23.)

i. To facilitate reassembly, index (mark with an approved marking pencil) torquemeter plate assembly (33, figure 6-22) to flange of bearing support (9). (See figure 6-24.)

j. Remove screws (38, figure 6-22) securing torquemeter plate to front bearing support assembly flange.

k. Using three 1/4-28 jackscrews, remove internal ring gear (34) and torquemeter plate assembly (33). When jacking the assembly, tilt planet gearshafts (32) inboard to clear planet gear bearings and to free planet gears from internal gear. (See figure 6-25.)

CAUTION

To prevent dropping the torquemeter balls in following step l., hold torquemeter assembly firmly together when lifting from bearing support.

l. Continue to tighten jackscrews evenly until torquemeter assembly is clear of planet gears and bearings.

CAUTION

In following step m., take care not to drop the torquemeter balls. Damaged balls must be rejected.

m. Place torquemeter assembly on clean dry work surface. Gently lift propeller reduction internal ring gear (34, figure 6-22), making sure that 24 torquemeter balls (35) are retained in torquemeter plate assembly (33). Remove torquemeter balls and place in suitable container.

n. Remove three seals (42).

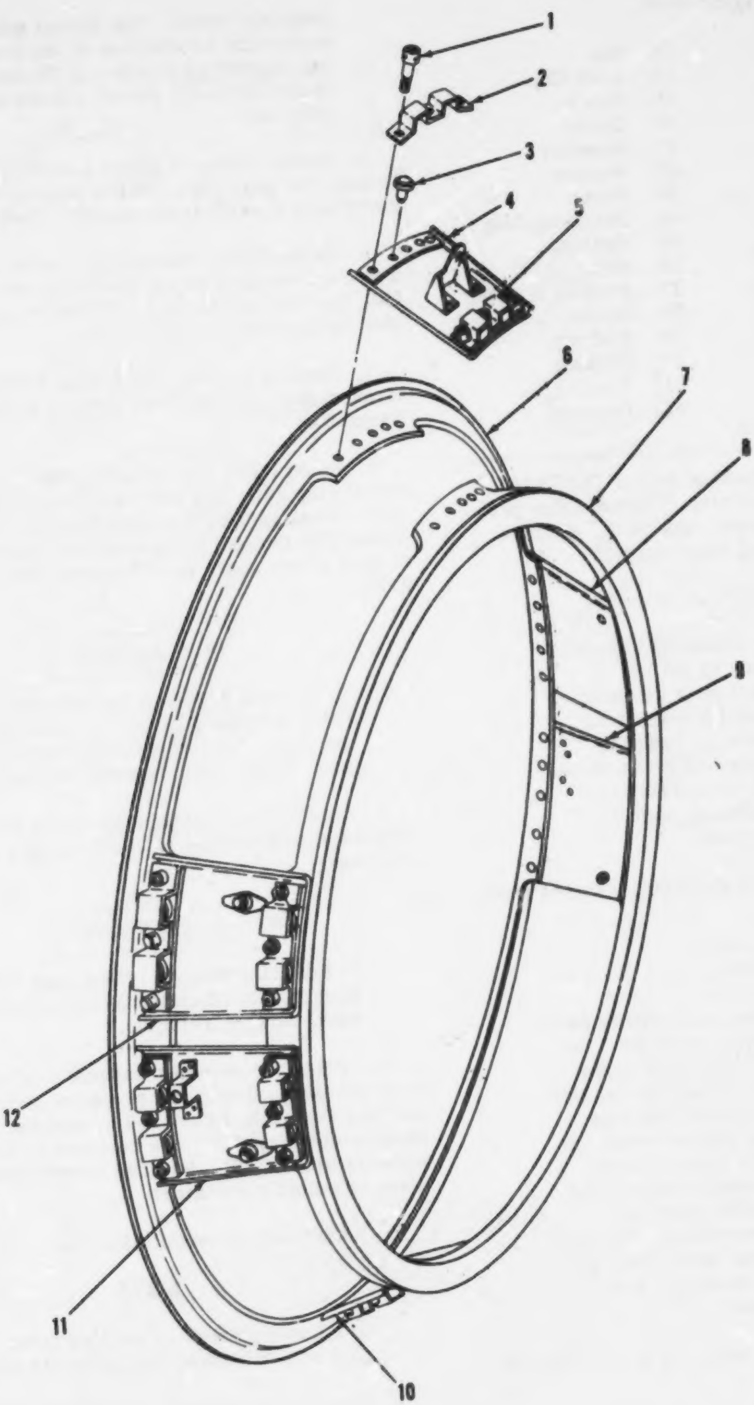
NOTE

In following step o., bearing outer races (31) will remain in the propeller shaft.

o. Remove three planet gearshafts (32) from propeller shaft (30).

NOTE

If the outer races of the bearings cannot be removed by hand in following step p., a suitable bearing puller may be used.



1. Screw
2. Retainer
3. Pin
4. Support Assembly
5. Retainer
6. Flange
7. Flange
8. Support Assembly
9. Support Ass
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11. Support Ass
12. Support Ass

Figure 6-21. Exhaust Diffuser Support Cone Assembly (T53-L-15/701) - Exploded View

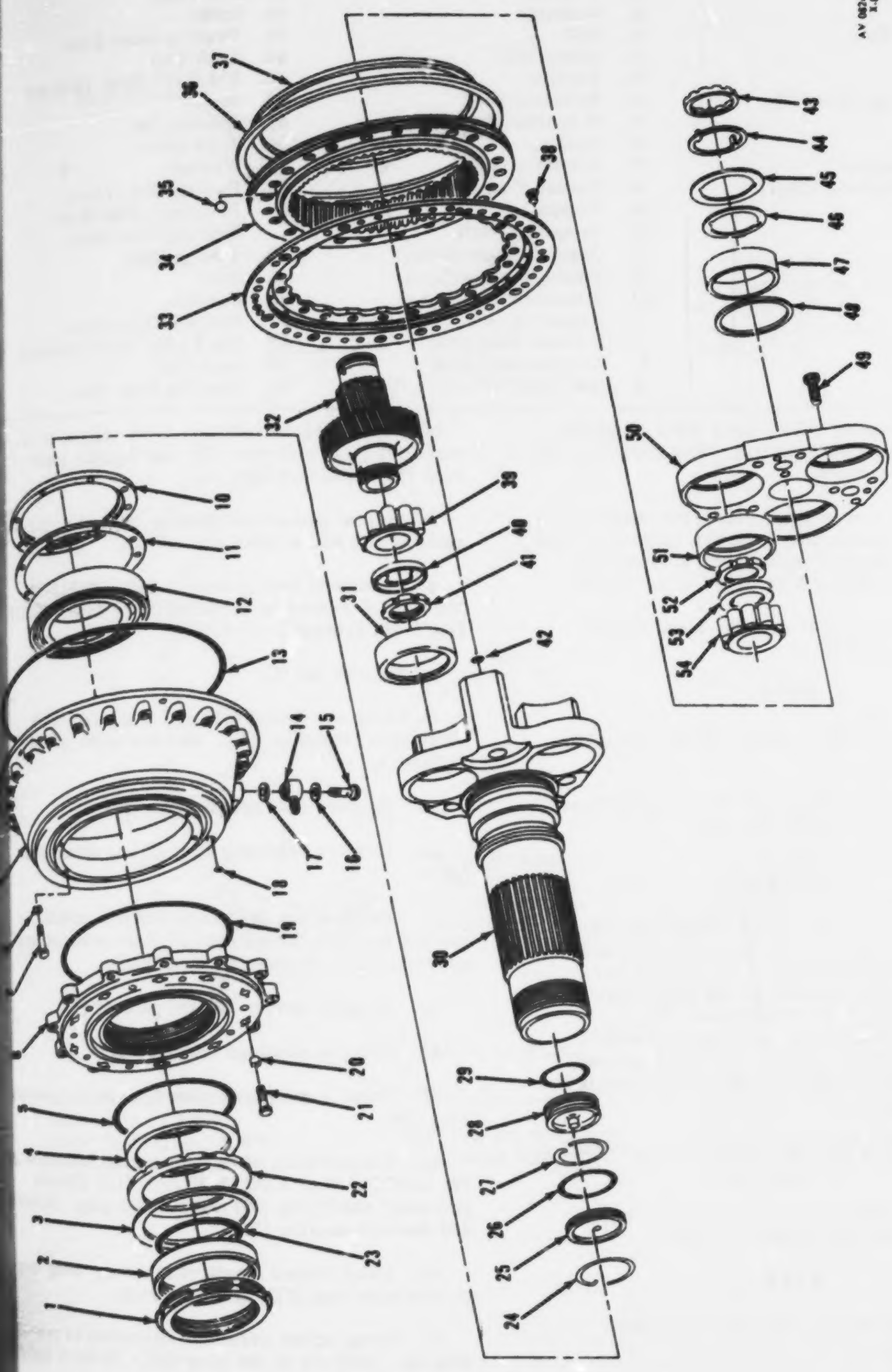
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Figure 6-22. Reduction Gear Assembly (T53-L-7/7A/15) - Exploded View

Key to Figure 6-22.

1. Nut
2. Spacer
3. Retaining Ring
4. Seal
5. Packing
6. Seal Housing Assembly
7. Bolt
8. Tabwasher
9. Bearing Support
10. Bearing Retainer Plate
11. Shim
12. Bearing
13. Packing
14. Connector
15. Bolt
16. Washer
17. Washer
18. Packing
19. Packing
20. Retainer
21. Bolt
22. Shield Seal
23. Packing
24. Retaining Ring
25. Propeller Shaft Plug
26. Packing
27. Retaining Ring
28. Thrust Plug
29. Packing
30. Propeller Shaft
31. Bearing Outer Race
32. Planet Gearshaft
33. Torquemeter Plate Assembly
34. Internal Ring Gear
35. Torquemeter Ball
36. Seal Ring
37. Seal Ring
38. Screw
39. Bearing Inner Race
40. Lock Cup
41. Nut (Left-Hand Threaded)
42. Seal
43. Spanner Nut
44. Tabwasher
45. Washer
46. Bearing Pinch Shim
47. Propeller Shaft Rear Bearing Inner Race
48. Sealing Ring
49. Bolt
50. Carrier
51. Bearing Outer Race
52. Nut (Right-Hand Threaded)
53. Lock Cup
54. Bearing Inner Race

p. Remove bearing outer races from propeller shaft with slight twisting motion. Tag and place with corresponding bearings.

q. If necessary to replace planet gearshaft or bearings, place planet gearshaft (32) in gear holding fixture (LTCT4018) and install gear holding ring assembly (LTCT4016 or LTCT2097 or LTCT645).

r. Using suitable drift and soft-faced mallet, straighten lock cup (53).

NOTE

In following step s., nuts (52) have a right-hand thread.

s. Using socket wrench (LTCT569), remove nut (52) and lock cup. Discard lock cup.

CAUTION

In following step t., place tagged bearing outer race (removed in preceding step p.) with bearing inner race (54), making certain that serial number on the outer race matches that on the inner race. To facilitate reassembly, identify the assembled bearing as to planet gear part number and position (forward or aft) from which it was removed.

t. Using suitable bearing puller, remove bearing inner race (54).

u. Remove planet gear assembly from fixture; turn assembly over and replace in fixture.

NOTE

In following step v., nut (41) has a left-hand thread.

v. Repeat preceding steps s. through u. to remove nut (41), lock cup (40), and bearing inner race (39). Discard lock cup.

w. Repeat preceding steps q. through v. for remaining two planet gear assemblies.

x. Remove thread protector cap, AN5012-50, and wrench assembly (LTCT2019) or handle (LTC 182) from propeller shaft (30).

y. Remove nut (1).

z. Using soft-faced mallet and suitable drift, straighten retainers (20). Remove bolts (21) and retainers.

aa. Remove seal housing assembly (6).

ab. Remove retaining ring (3) and shield seal (22).

ac. Using arbor press and suitable adapter to contact seal OD, press seal (4) from seal housing assembly (6). Remove packing (5).

ad. Remove spacer (2) and packing (23).

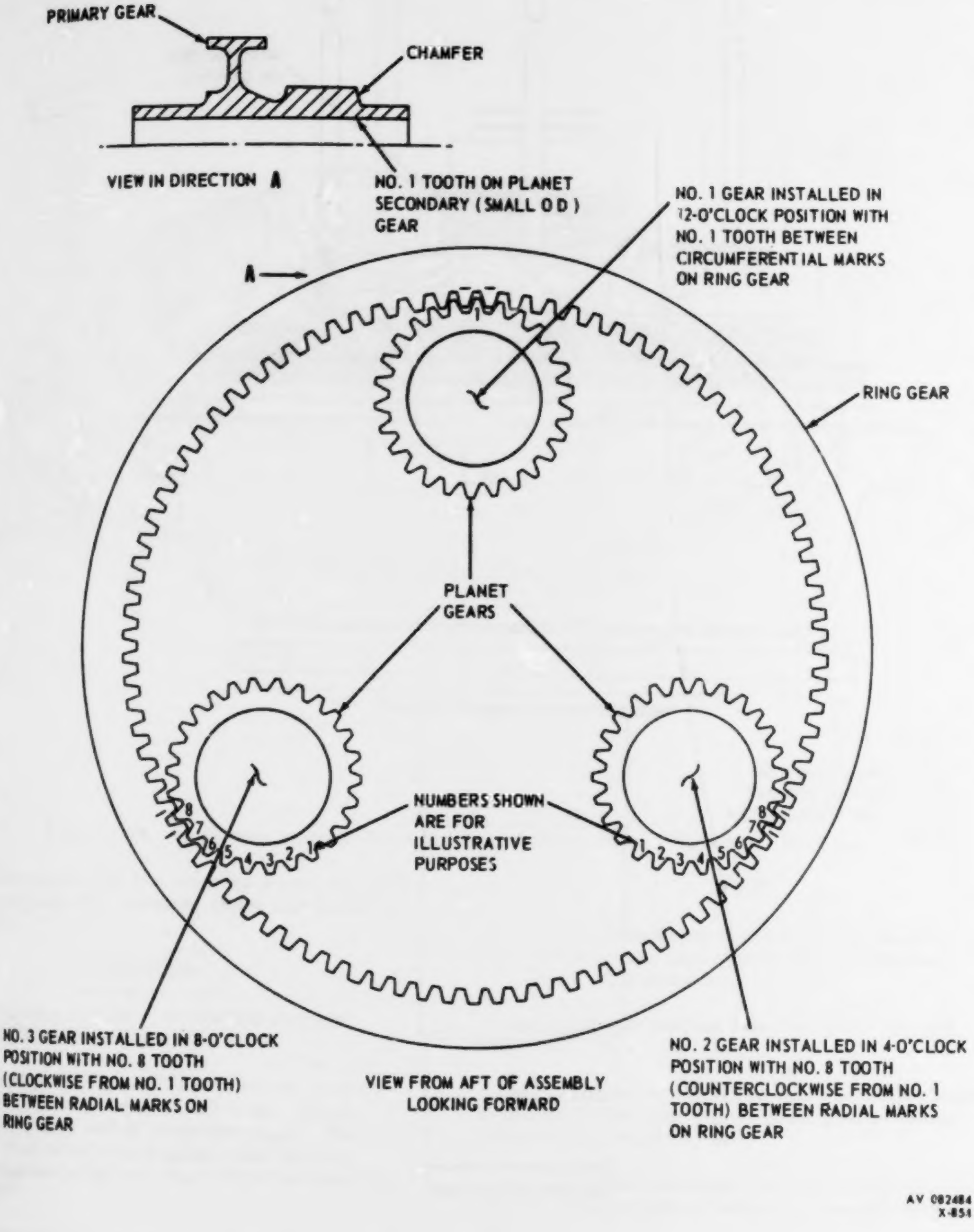
ae. Remove packings (13 and 19).

af. Using needle-nose pliers, remove retaining ring (24).

ag. Thread shaft of propeller plug puller assembly (LTCT4510 or LTCT2022 or LTCT177) into propeller shaft plug (25) and remove plug. Remove and discard packing (26).

ah. Using looped length of lockwire, snag [illegible] of retaining ring (27). Remove ring.

ai. Using puller assembly described in preceding step ag., remove thrust plug (28). Remove and discard packing (29).


PRIMARY GEAR
CHAMFER
VIEW IN DIRECTION A
NO. 1 TOOTH ON PLANET SECONDARY (SMALL O D) GEAR
NO. 1 GEAR INSTALLED IN 12-O'CLOCK POSITION WITH NO. 1 TOOTH BETWEEN CIRCUMFERENTIAL MARKS ON RING GEAR
A
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RING GEAR
PLANET GEARS
NUMBERS SHOWN ARE FOR ILLUSTRATIVE PURPOSES
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NO. 3 GEAR INSTALLED IN 8-O'CLOCK POSITION WITH NO. 8 TOOTH (CLOCKWISE FROM NO. 1 TOOTH) BETWEEN RADIAL MARKS ON RING GEAR
VIEW FROM AFT OF ASSEMBLY LOOKING FORWARD
NO. 2 GEAR INSTALLED IN 4-O'CLOCK POSITION WITH NO. 8 TOOTH (COUNTERCLOCKWISE FROM NO. 1 TOOTH) BETWEEN RADIAL MARKS ON RING GEAR
AV 082484
X-854

Figure 6-23. Reduction Gear Timing Mark Alignment

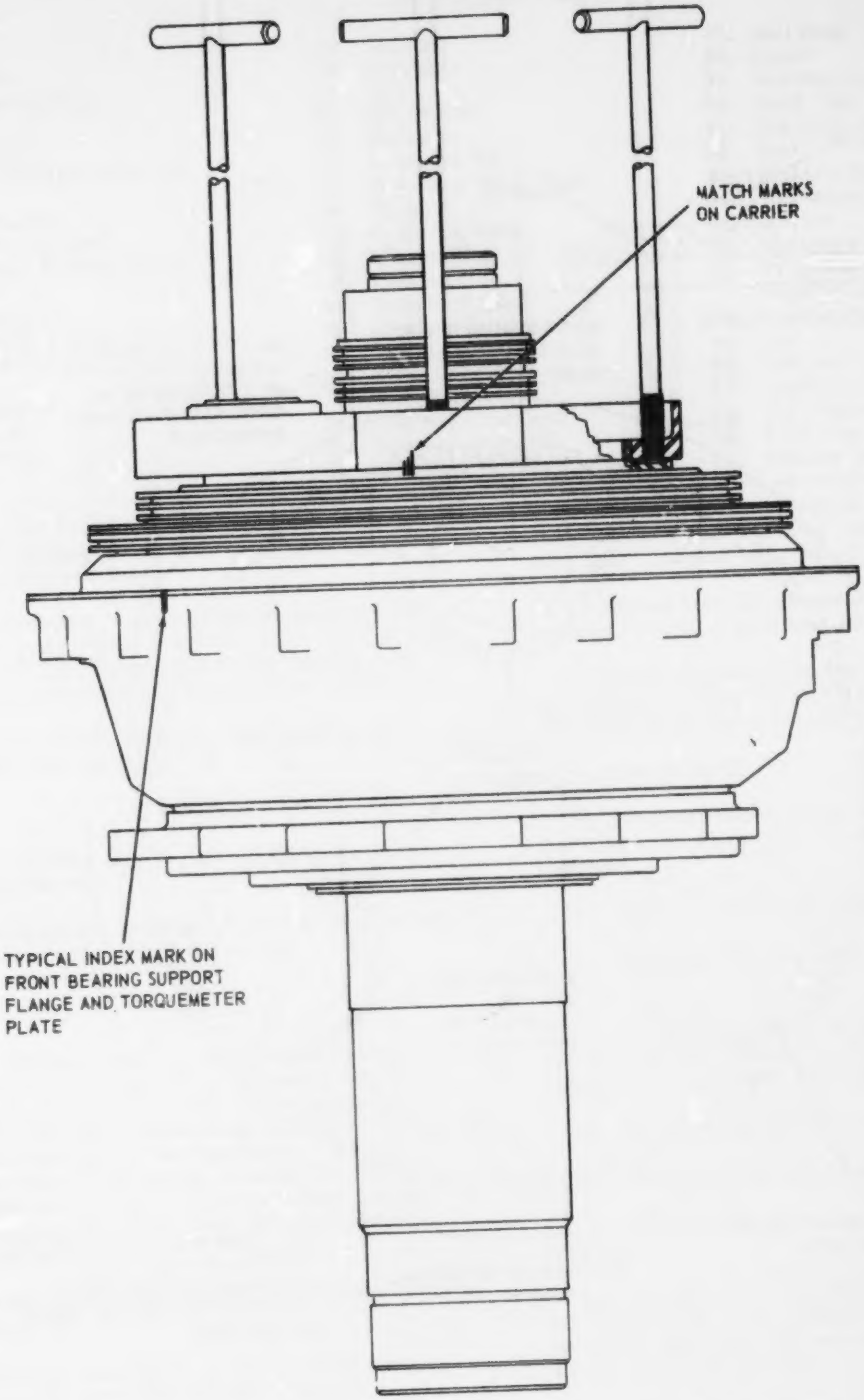

MATCH MARKS
ON CARRIER
TYPICAL INDEX MARK ON
FRONT BEARING SUPPORT
FLANGE AND TORQUEMETER
PLATE

Figure 6-24. Propeller Shaft Carrier - Removal

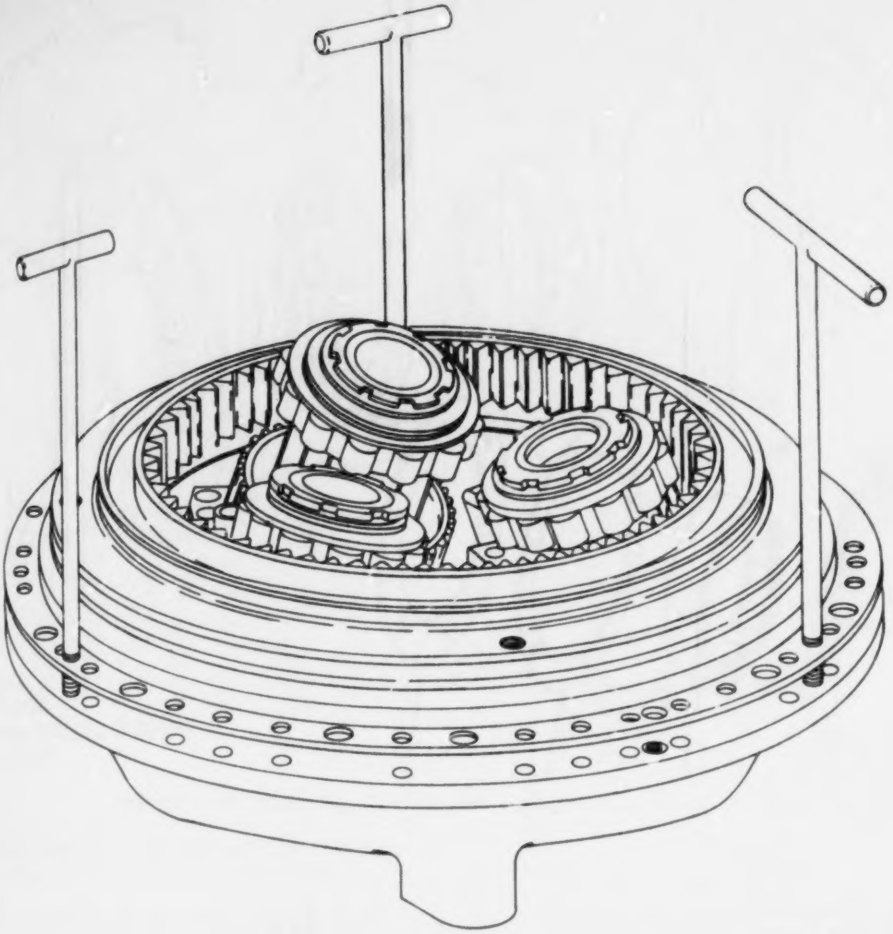


Figure 6-25. Reduction Internal Gear and Torquemeter Plate Assembly - Removal

Remove bolt (15) that secures connector (14)
ring support (9). Remove elbow and washers
d 17).

CAUTION

n following step ak., to prevent damage,
o not drop propeller shaft.

Place propeller shaft assembly on support
TCT179) with propeller shaft up. Place
c block over end of propeller shaft. Place
ler shaft along with support ring in arbor
and press propeller shaft (30) from bearing
t (9).

Straighten tabwashers (8) and remove bolts
tabwashers.

NOTE

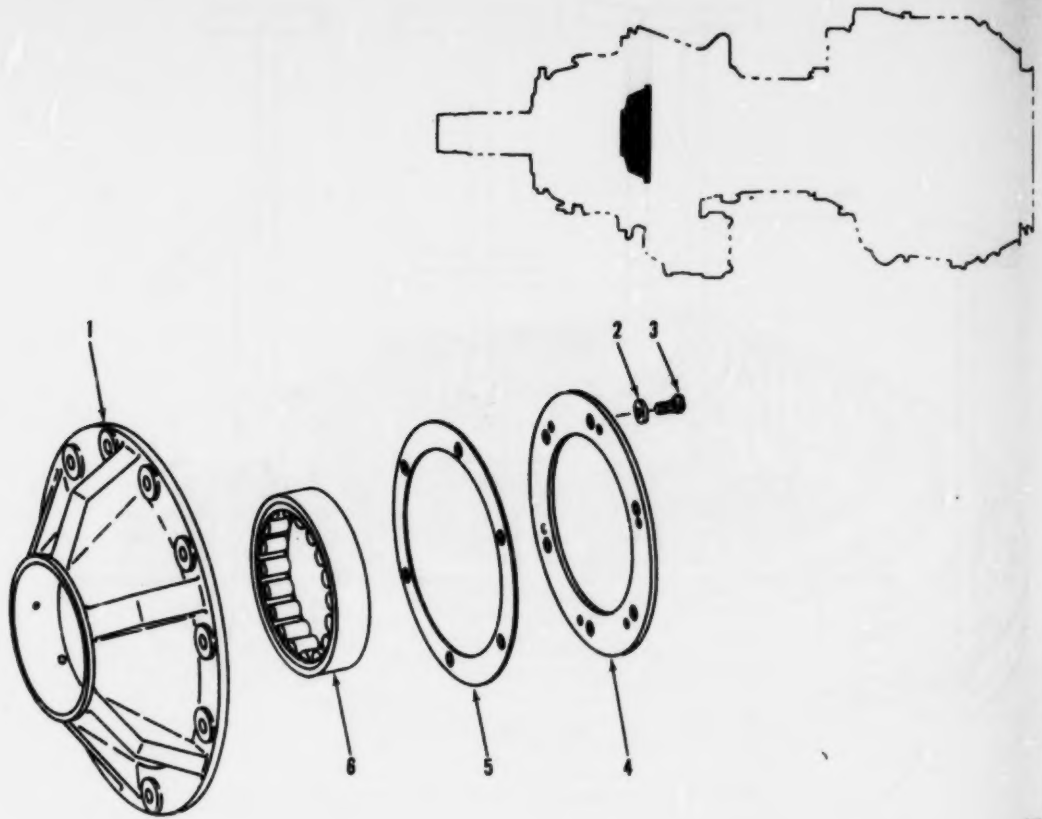
Record thickness of shim (11) in following step am. and attach shim to retainer plate with lockwire.

am. Remove bearing retainer plate (10) and shim (11).

an. Using an arbor press and a suitable adapter to contact thrust bearing OD (12), press bearing from bearing support (9).

ao. If metal seal rings (36 and 37) are damaged, remove from propeller reduction internal ring gear (34).

6-25. DISASSEMBLY OF REAR BEARING SUPPORT ASSEMBLY (T53-L-7/7A/15 Engines). (See figure 6-26.) Proceed as follows.



1. Support Assembly
2. Tabwasher
3. Bolt
4. Plate
5. Shim
6. Bearing Outer Race

Figure 6-26. Rear Bearing Support (T53-L-7/7A/15) - Exploded View

NOTE

Do not disassemble the rear bearing support if it is to be returned to Depot Maintenance with the reduction gear assembly.

a. Straighten tabwashers (2) and remove bolts (3) and tabwashers that secure plate (4) to support assembly (1).

b. Remove plate and shims (5).

c. Remove bearing outer race (6) from support assembly, using fiber drift and soft-faced mallet if necessary.

6-26. DISASSEMBLY OF REAR BEARING SUPPORT ASSEMBLY (T53-L-701 Engine). (See figure 6-27.) Proceed as follows:

a. Remove bolts (7) that secure plate (6) to support assembly (3).

b. Remove plate and shim (5).

c. Remove outer race of bearing (4) from using fiber drift and mallet, if necessary.

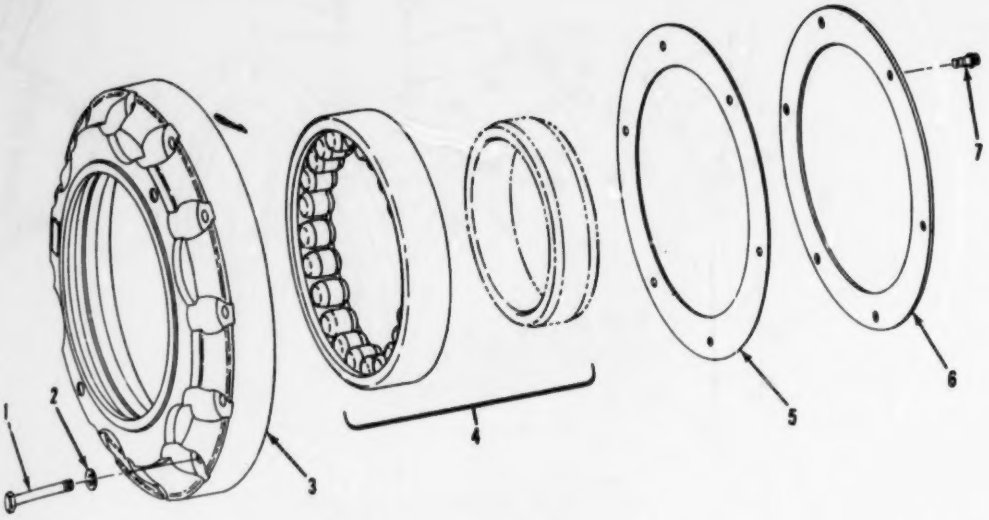
6-27. DISASSEMBLY OF COMPRESSOR HOU ASSEMBLY. (See figure 6-28.) Proceed as fo

a. Remove upper or lower half of compress housing assembly. (Refer to paragraph 3-57.)

b. Place compressor housing assembly hal bench and secure to bench to prevent movem

c. Remove capscrews (4, 5, 15 and 16, figu 6-28) washers (3, 6, 15, and 17) that secure fi through fourth stage compressor vane assem (8, 10, 11, and 12). Remove vane assemblies.

d. Remove two capscrews (1) and bolt retai (2), and three bolts (18) and washers (19) that sec guide vane assembly (13). Remove vane assem



1. Bolt
2. Washer
3. Rear Bearing Support Assembly
4. Bearing Outer Race
5. Shim
6. Plate
7. Bolt

Figure 6-27. Rear Bearing Support (T53-L-701) - Exploded View

'DISASSEMBLY OF INLET HOUSING ASSEM-
(See figure 6-29.) Proceed as follows:

Remove bolts (1) and washers (2) that secure
(3) to inlet housing assembly.

Remove cover and packings (4 and 5) from inlet
g assembly.

Remove retaining ring (11) that secures oil sup-
zle in inlet housing assembly. Remove power
oil supply nozzle assembly by inserting a
screw into oil supply filter (7). Withdraw
takeoff oil supply nozzle assembly from inlet
assembly.

Remove setscrews (9 and 10) and disc (8) from
7).

Remove packing (6) from filter.

DISASSEMBLY OF ENGINE ACCESSORIES.

DISASSEMBLY OF STARTING FUEL NOZZLE
BLY (T53-L-7/7A Engines). (See figure
Proceed as follows.

CAUTION

Use care to prevent damage to the sealing faces or functional surface finishes. Do not alter dimensions during disassembly.

NOTE

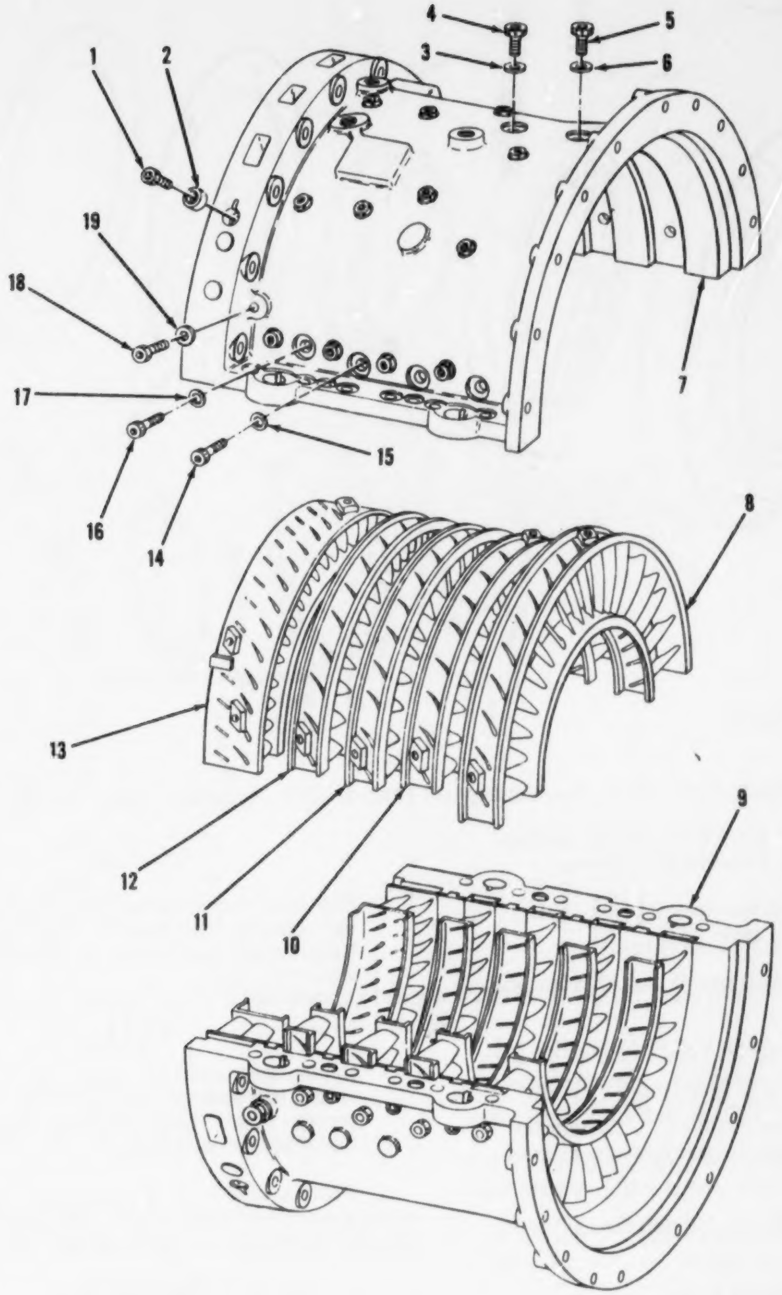
During disassembly, maintain a close visual inspection, noting presence of foreign matter and any other condition indicating contamination.

a. Place nozzle body subassembly (13) in 3/8-inch collet mounted in collet vise. Cut tack welds between retainer (1) and body subassembly.

CAUTION

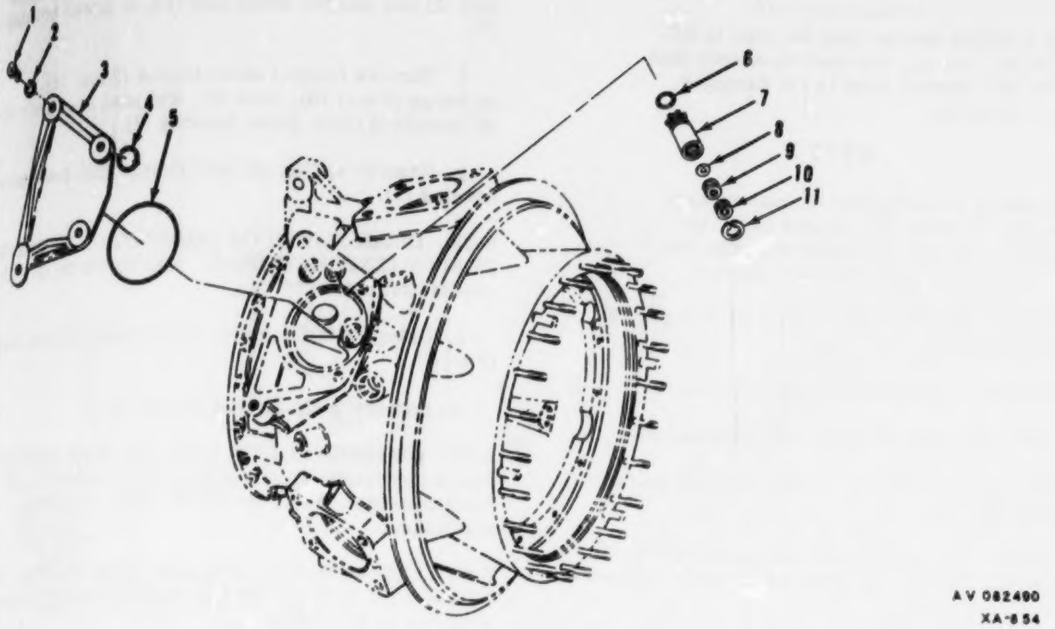
In following step b., the starting fuel nozzle assembly is spring-loaded. Use care to ensure that parts are not lost or dropped as the retainer (1) is removed.

b. Unscrew and remove retainer (1) from nozzle body subassembly.



1. Capscrew
2. Bolt Retainer
3. Washer
4. Capscrew
5. Capscrew
6. Washer
7. Upper Compressor Housing
8. First Stage Compressor Vane Assembly
9. Lower Compressor Housing
10. Second Stage Compressor Vane Assembly
11. Third Stage Compressor Vane Assembly
12. Fourth Stage Compressor Vane Assembly
13. Exit Guide Vane Assembly
14. Capscrew
15. Washer
16. Capscrew
17. Washer
18. Bolt
19. Washer

Figure 6-28. Compressor Housing Assembly - Exploded View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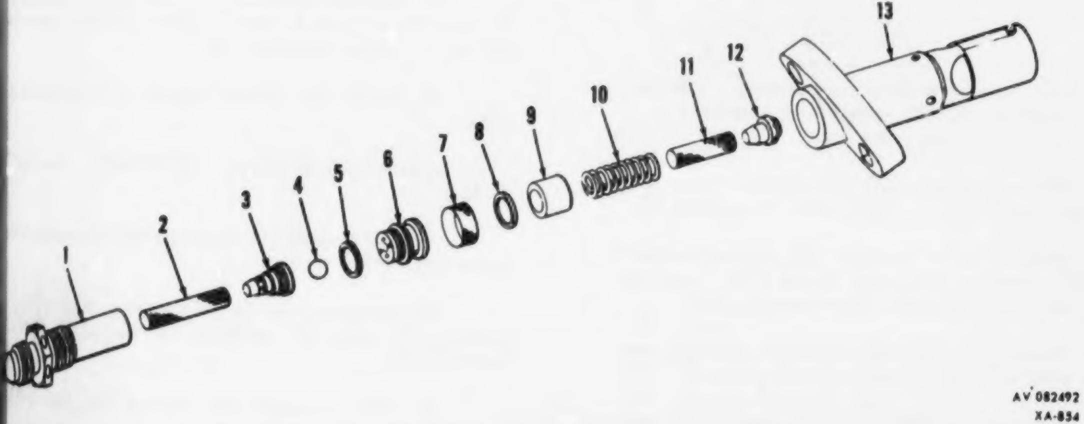
1. Bolt
2. Washer
3. Starter Pump Cover
4. Packing
5. Packing
6. Packing
7. Filter
8. Disc
9. Setscrew
10. Setscrew
11. Retaining Ring

Figure 6-29. Inlet Housing Assembly - Exploded View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1. Retainer
2. Strainer
3. Guide
4. Ball
5. Seal
6. Seat
7. Air Strainer
8. Seal
9. Spring Seat
10. Spring
11. Strainer
12. Distributor
13. Body Subassembly

Figure 6-30. Starting Fuel Nozzle Assembly (T53-L-7/7A) - Exploded View

CAUTION

If a prying device must be used in following step c., use care to ensure that the ball contact area is not damaged or distorted.

NOTE

Strainer (2) and guide (3) may remain in the retainer (1). In this case, insert a 1/8-inch diameter rod into the retainer and push out these parts.

c. Remove ball (4), guide (3), and strainer (2) from retainer (1).

d. Remove nozzle from collet and invert.

e. Withdraw seat (6) from body subassembly.

f. Remove air strainer (7) and seals (5 and 8) from seat (6).

g. Remove spring seat (9), spring (10), strainer (11), and distributor (12) from nozzle body subassembly (13).

6-31. DISASSEMBLY OF FLOW DIVIDER AND DUMP VALVE ASSEMBLY (T53-L-15/701 Engines).

(See figure 6-31.) Proceed as follows.

NOTE

Do not disassemble flow divider and dump valve assembly unless flow check (refer to paragraph 8-49) is to be performed after reassembly.

To ensure proper reassembly, note position of bracket in following step a.

CAUTION

Use care when removing bracket. Spring retainer cap (15, figure 6-31) beneath bracket is under tension.

a. Remove screws (17) that secure cover bracket (16) and upper housing (10) to lower housing (7).

b. Remove cover bracket (16), spring retainer cap (15), packing (14), and spring (13). Separate upper housing (10) from lower housing (7).

c. Shake shim (12) out of plunger (11) and remove plunger from upper housing (10).

d. Remove packings (8 and 9) from lower housing (7).

CAUTION

In following step e., use care when removing screws. Union halves are under spring tension.

e. Remove screws (1) that secure flanged un half (2) and flanged union half (18) to lower hous (7).

f. Remove flanged union halves (2 and 18), packings (5 and 19), seal (6), and seal assembly (4 (if installed) from lower housing (7).

g. Remove spring (3) and plunger (20) from low housing (7).

6-32. DISASSEMBLY OF COMBUSTION CHAMBE DRAIN VALVE ASSEMBLY.

(See figure 6-32.) Pro ceed as follows:

a. Using suitable punch, drive pins (4) from bo (3 or 5).

b. Remove plate (1) and spring (2).

6-33. DISASSEMBLY OF FUEL HEATER ASSEM

For all procedures except external inspection and functional test, refer to TM 55-2840-217-40 as applicable.

6-34. DISASSEMBLY OF MAIN FUEL FILTER, P 123998 AND P/N 045468 (DS AND GS MAINTENAN

Proceed as follows:

a. Disassembly of filter, P/N 123998. (See fig 6-33.)

(1) Remove bolt (1) and seal (2).

(2) Remove body assembly (3), element ass bly (5), and packing (4).

(3) Remove screws (6), valve retainer (7), packing (18), gasket (3), packing (9), valve assem (10) and spring (11).

(4) Remove screws (16) that secure press switch (17) to base assembly (12). Remove press switch (17) and packings (13).

(5) Remove plug and bleeder (15) and packi (14).

b. Disassembly of filter, P/N 045468. (See fig 6-34.)

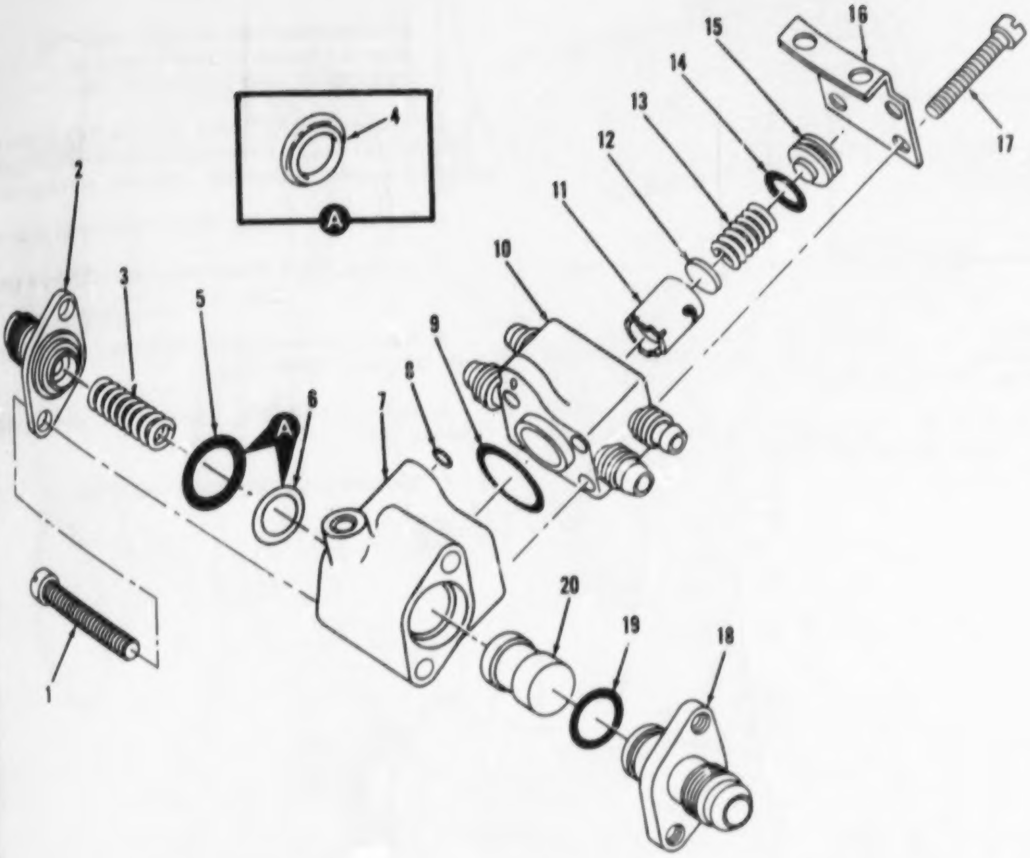
(1) Twist bowl (1) counterclockwise until b from head (13).

(2) Remove bowl (1), element assembly (5), packing (4), plug (3), packing (6), spring (7), and packing (8).

(3) Remove nipple (9), spring (10), valve (packing (12), and gasket (2).

(4) Remove screws (16) that secure switc (15) to head (13).

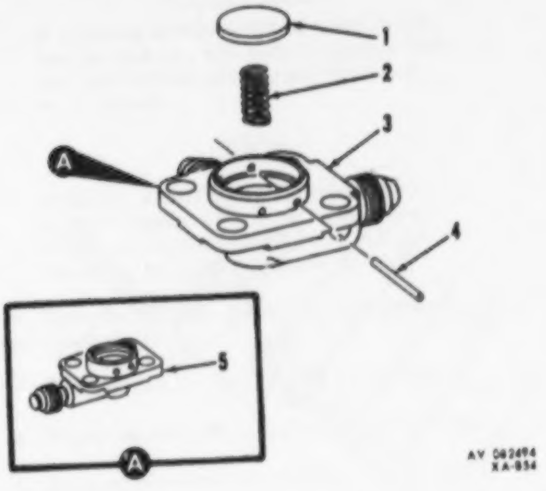
(5) Remove switch (15), packings (14), p (17), and packing (18).



1. Screw
2. Flanged Union Half
3. Spring
4. Seal Assembly*
5. Packing
6. Seal
7. Lower Housing
8. Packing
9. Packing
10. Upper Housing
11. Plunger
12. Shim
13. Spring
14. Packing
15. Spring Retainer Cap
16. Cover Bracket
17. Screw
18. Flanged Union Half
19. Packing
20. Plunger

* Used on flow divider and dump valve assembly 1-180-190-01

Figure 6-31. Flow Divider and Dump Valve Assembly (T53-L-15/701) - Exploded View



1. Plate
2. Spring
3. Body (T53-L-15/701)
4. Pin
5. Body (T53-L-7/7A)

Figure 6-32. Combustion Chamber Drain Valve Assembly - Exploded View

6-35. DISASSEMBLY OF POWER-DRIVEN ROTA (OIL) PUMP. For all procedures, except external inspection and functional test, refer to TM 55-2840-213-40 or TM 55-2840-216-40 as applicable.

6-36. DISASSEMBLY OF LUBE OIL FILTER AS-SEMBLY. (See figure 6-35.) Proceed as follows.

NOTE

Disassemble lube oil filter assembly only to replace damaged parts or clean filter cover assembly (14).

a. Loosen bolt (20) that secures filter cover assembly (14) to filter housing subassembly (1) and withdraw cover assembly. Remove packing (15).

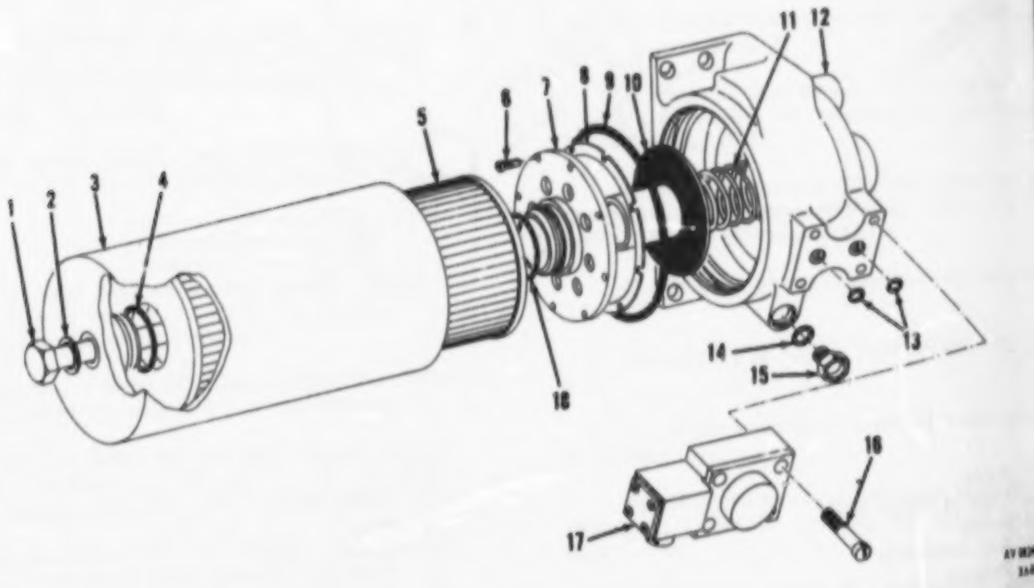
b. Remove retaining ring (11) and end plate (12

c. Carefully lift filter elements (13) from cover (17).

d. Using two wrenches, hold nut (16) and turn bolt (20) until nut is free.

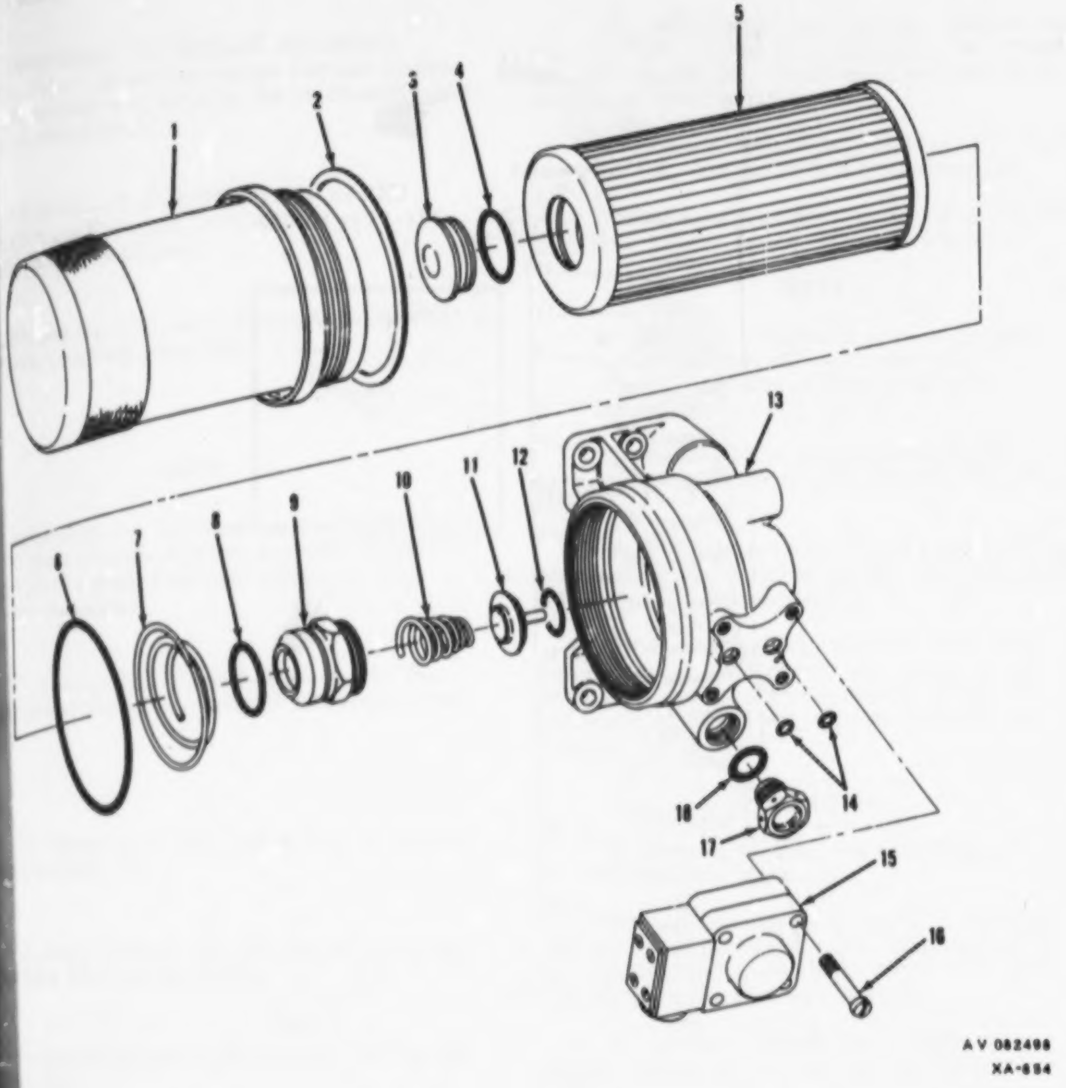
e. Remove bolt (20), washer (19), packing (18), and nut (16).

f. Remove plug (10) and packing (9).



1. Bolt
2. Seal
3. Body Assembly
4. Packing
5. Element Assembly
6. Screw
7. Valve Retainer
8. Gasket
9. Packing
10. Valve Assembly
11. Spring
12. Base Assembly
13. Packing
14. Packing
15. Plug and Bl
16. Screw
17. Pressure Sw
18. Packing

Figure 6-33. Main Fuel Filter Assembly, P/N 123998 (DS and GS Maintenance) - Exploded View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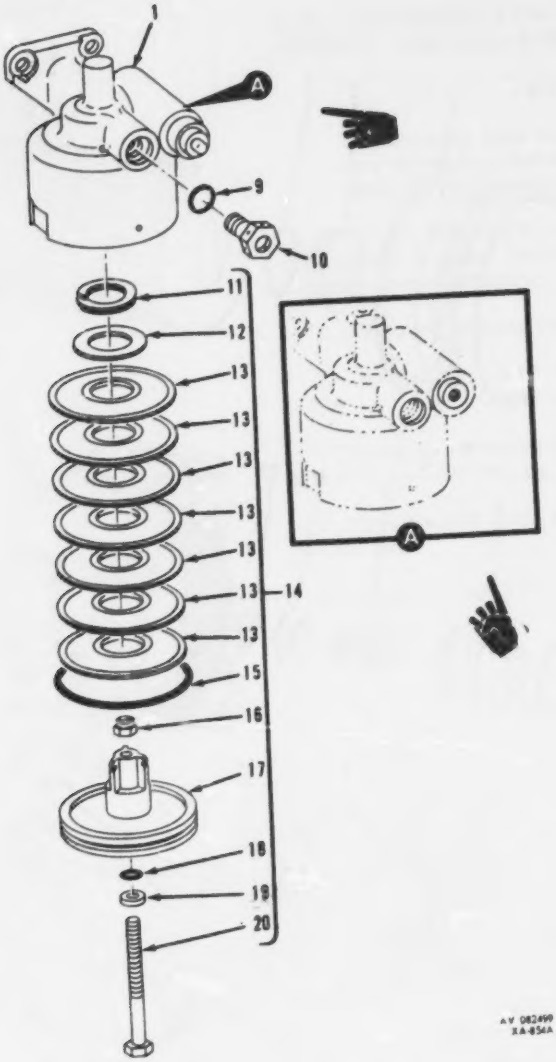
1. Bowl
2. Gasket
3. Plug
4. Packing
5. Element Assembly
6. Packing
7. Spring
8. Packing
9. Nipple
10. Spring
11. Valve
12. Packing
13. Head
14. Packing
15. Switch
16. Screw
17. Plug
18. Packing

Figure 6-34. Main Fuel Filter Assembly, P/N 045468 (DS and GS Maintenance) - Exploded View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1. Filter Housing Subassembly
■ 2. through 8 deleted
9. Packing
10. Plug
11. Retaining Ring
12. End Plate
13. Filter Elements
14. Filter Cover Assembly
15. Packing
16. Nut
17. Cover
18. Packing
19. Washer
20. Bolt
■ 21. through 25 deleted

Figure 6-35. Lube Oil Filter Assembly - Exploded View

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. DISASSEMBLY OF HOT-AIR SOLENOID VE. For all procedures except external inspec- and functional test, refer to TM 55-2840-214-40 M 55-2840-223-40.

. DISASSEMBLY OF INTERSTAGE BLEED UATOR ASSEMBLIES 1-170-050-04 and 1-170- 09. Proceed as follows:

. Disassembly of actuator assembly 1-170-050- 53-L-7 engines). (See figure 6-36.)

NOTE

In following step (1), brackets are installed in place of washers in two positions on cover. Remove brackets and note position of each for reassembly.

(1) Remove bolts (27) and washers (28). Se- housing and screw assembly (45) from cover

(2) Remove guide (44), spring (43), and piston d assembly (31).

3) Remove piston rings (34 and 38), seal (33), cking (32) from piston (36).

) Remove snapring (37) and push pin (35) out (36).

) Withdraw rod end (42) from piston (36) and ut (41). Unscrew rod end bearing (39) from (42) and remove washer (40) and nut (41).

) Remove packing (30) from cover (29). Re- ion (5), packing (6), nuts (1 and 7), and (22 and 26). Remove screws (23 and 25) and (2 and 8), springs (3 and 9), and washers)).

CAUTION

In following step (7), use care when removing diaphragm.

(7) Lift off relay valve cap (11). Remove nut (24), bolt (12), washer (13), diaphragm (14), washer (15), and spacer (16). Shake valve seat (17) out of oblong hole in cover (29).

(8) Remove reducer (21), packing (20), strainer assembly (19), and spring (18) from cover (29).

b. Disassembly of actuator assembly 1-170-050-09 (T53-L-7/7A engines). (See figure 6-37.)

NOTE

Brackets are installed in place of washers in two positions on cover. Remove brackets and note position of each for reassembly.

(1) Remove bolts (27) and washers (28). Separate housing and screw assembly (36) from cover (29).

(2) Remove piston (33), spring (34), and seat (35) from housing and screw assembly. Remove packing (31) and seal (32) from piston.

(3) Remove packing (30) from cover (29). Remove union (5), packing (6), nuts (1 and 7), and washers (2 and 8). Remove screws (23 and 25) and washers (22 and 26), springs (3 and 9), and washers (4 and 10).

CAUTION

In following step (4), use care when removing diaphragm.

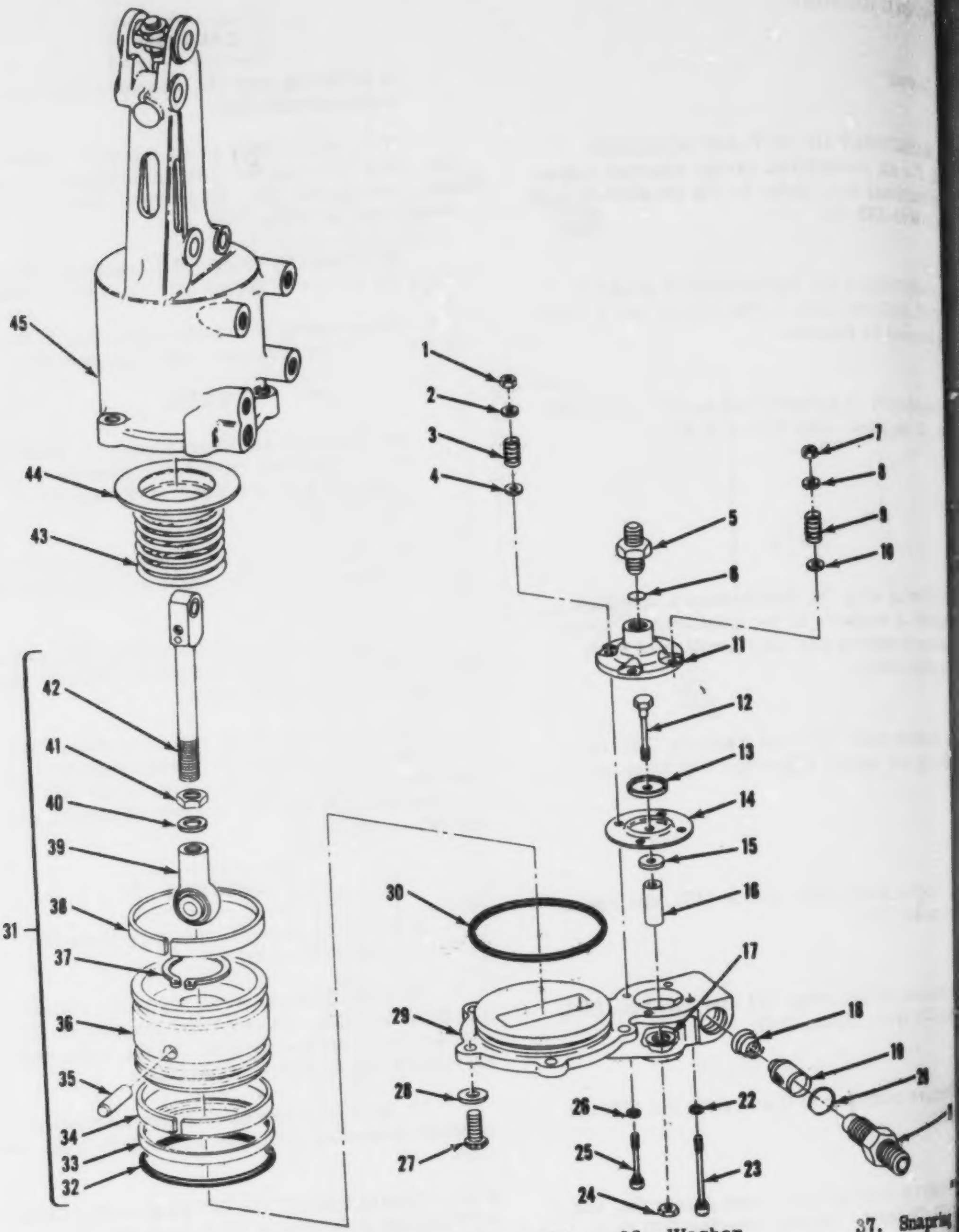
(4) Lift off relay valve cap (11). Remove nut (24), bolt (12), washer (13), diaphragm (14), washer (15), and spacer (16). Shake valve seat (17) out of oblong hole in cover (29).

(5) Remove reducer (21), packing (20), strainer assembly (19), and spring (18) from cover (29).

6-40. DISASSEMBLY OF INTERSTAGE BLEED ACTUATOR ASSEMBLY (T53-L-15/701 Engines). (See figure 6-38.) Proceed as follows:

a. Remove bolts (27), washers (28), and bracket (29). Separate housing assembly (37) from cover (30).

b. Remove piston (34), spring (35), and seat (36) from housing assembly (37). Remove packing (32) and seal (33) from piston.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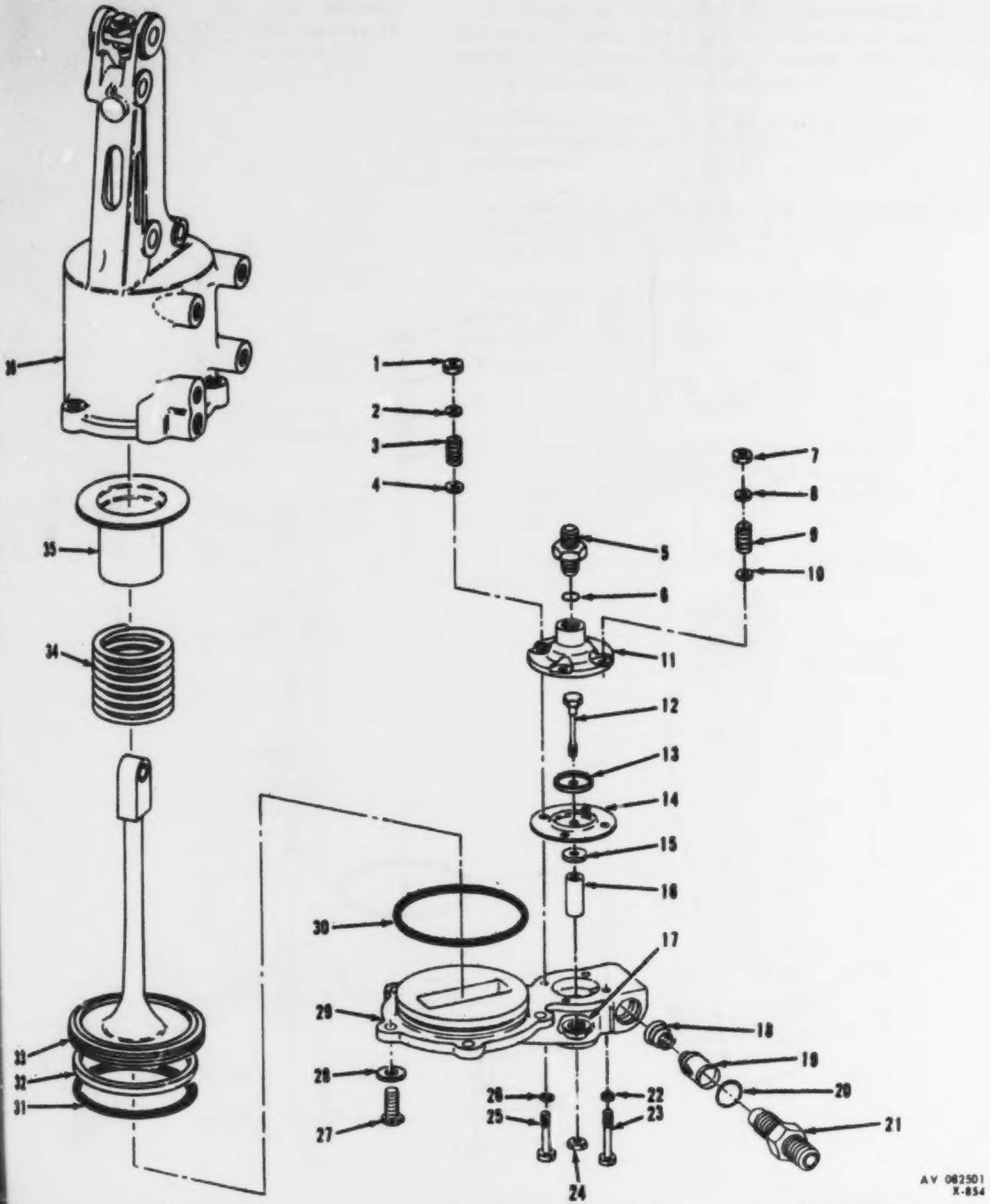
1. Nut
2. Washer
3. Spring
4. Washer
5. Union
6. Packing
7. Nut
8. Washer
9. Spring
10. Washer
11. Relay Valve Cap
12. Bolt
13. Washer
14. Diaphragm
15. Washer
16. Spacer
17. Valve Seat
18. Spring
19. Strainer Assembly
20. Packing
21. Reducer
22. Washer
23. Screw
24. Nut
25. Screw
26. Washer
27. Bolt
28. Washer
29. Cover
30. Packing
31. Piston and Rod Assembly
32. Packing
33. Seal
34. Piston Ring
35. Pin
36. Piston
37. Snapring
38. Piston
39. Rod
40. Washer
41. Nut
42. Rod
43. Spring
44. Guide
45. Housing Assem

Figure 6-36. Interstage Bleed Actuator Assembly 1-170-050-04 (T53-L-7) - Exploded View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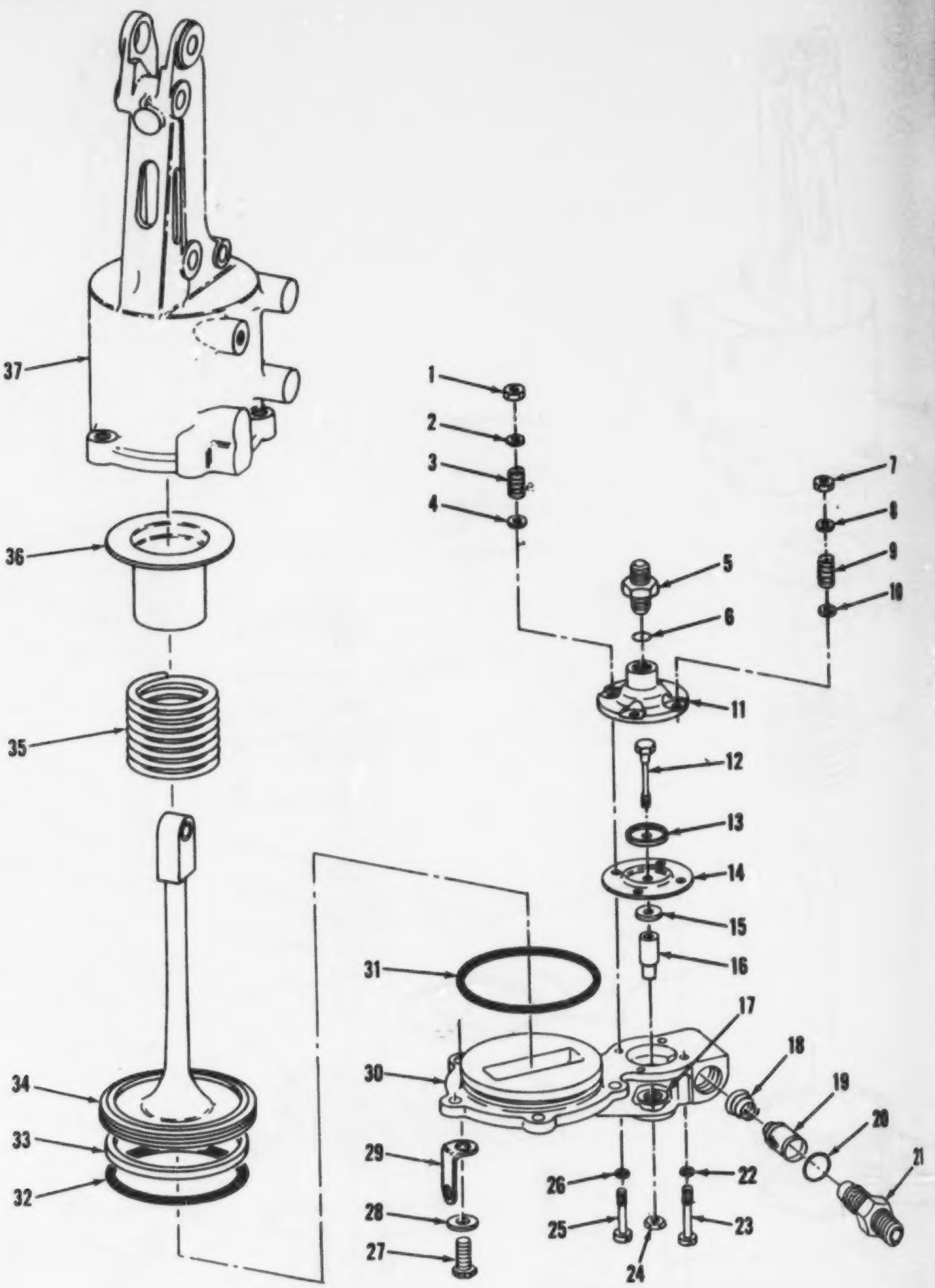
10. Washer
11. Relay Valve Cap
12. Bolt
13. Washer
14. Diaphragm
15. Washer
16. Spacer
17. Seat
18. Spring

19. Strainer Assembly
20. Packing
21. Reducer
22. Washer
23. Screw
24. Nut
25. Screw
26. Washer
27. Bolt

28. Washer
29. Cover
30. Packing
31. Packing
32. Seal
33. Piston
34. Spring
35. Seat
36. Housing and Screw Assembly

Figure 6-37. Interstage Bleed Actuator Assembly 1-170-050-09 (T53-L-7/7A) - Exploded View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1. Nut
2. Washer
3. Spring
4. Washer
5. Union
6. Packing
7. Nut
8. Washer
9. Spring
10. Washer
11. Cap
12. Bolt
13. Washer
14. Diaphragm
15. Washer
16. Spacer
17. Seat
18. Spring
19. Strainer Assembly
20. Packing
21. Reducer
22. Washer
23. Screw
24. Nut
25. Screw
26. Washer
27. Bolt
28. Washer
29. Bracket
30. Cover
31. Packing
32. Packing
33. Seal
34. Piston
35. Spring
36. Seat
37. Housing

Figure 6-38. Interstage Bleed Actuator Assembly (T53-L-15/701) - Exploded View

emove packing (31) from cover (30). Remove 5), packing (6), nuts (1 and 7), and washers (2 Remove screws (23 and 25), washers (22), springs (3 and 9), and washers (4 and 10).

CAUTION

n following step d., use care when remov- ng diaphragm.

ift off cap (11). Remove nut (24), bolt (12), s (13), diaphragm (14), washer (15), and (16). Shake seat (17) out of oblong hole in 30).

emove reducer (21), packing (20), strainer ly (19). and spring (18) from cover (30).

DISASSEMBLY OF INLET GUIDE VANE TOR ASSEMBLY (T53-L-15/701 Engines). ure 6-39.) Proceed as follows:

emove screws (20), washers (19), retainer d retaining ring (17). Remove housing (16) using (7). Remove packing (15) from (16).

b. Straighten retainer (5) to permit removal of screw (4 or 20A). Using 3/8-inch wrench on hex end of piston (14), prevent piston from turning while removing screw (4 or 20A). Remove retainer (5).

c. Remove piston (14) from housing (7). Remove packings (8 and 9) from piston. Remove connector (6).

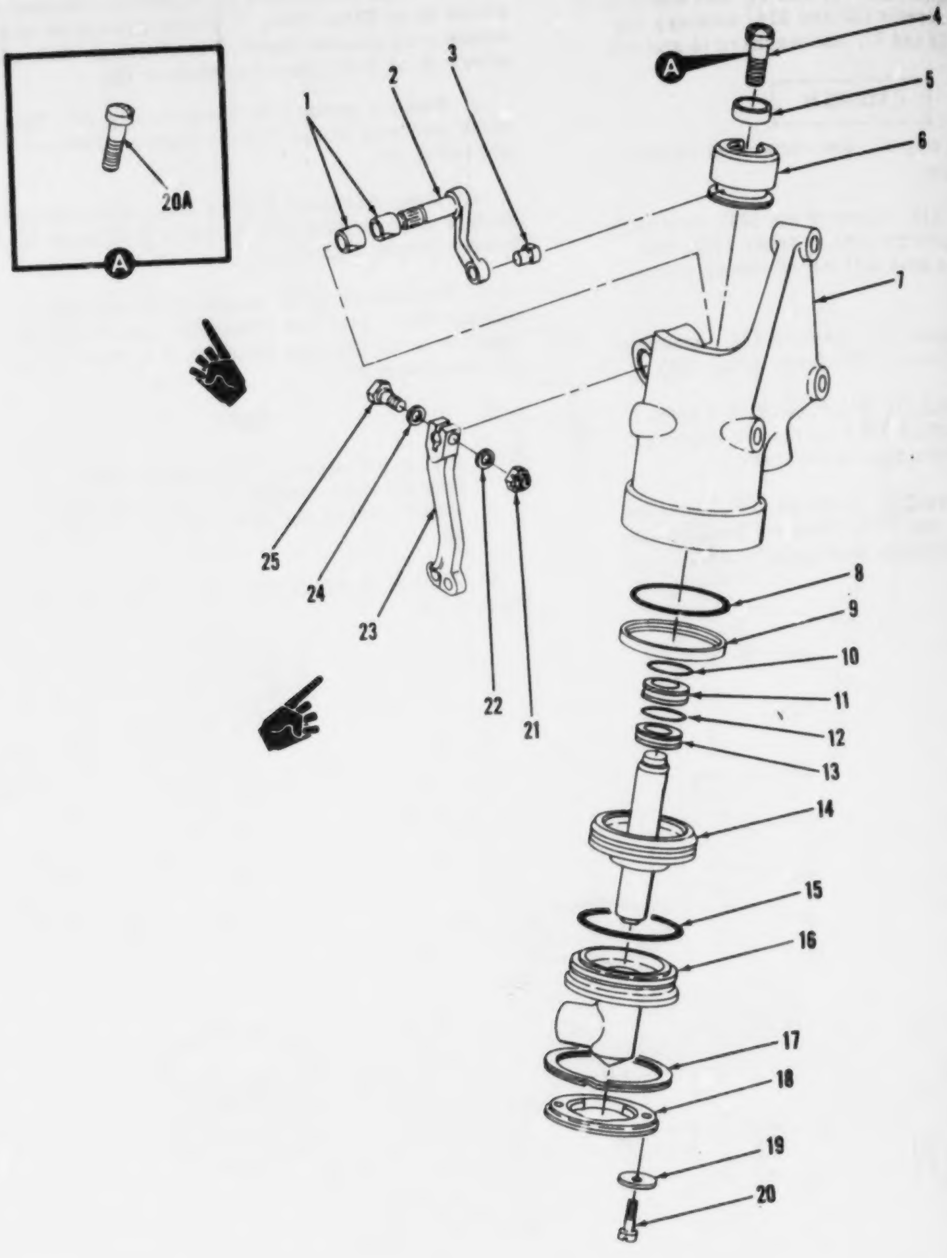
d. Using vibropeen etching tool, etch matchmark on face of lever (23) and splined end of lever (2) to ensure proper assembly.

e. Remove nut (21), washer (22), bolt (25), and washer (24). Separate lever (23) from lever (2). Remove lever (2) from bearings (1). Remove pin (3) from lever (2).

NOTE

If it is not necessary to remove bearings (1) from housing (7) in following step f. unless the bearings are damaged.

f. Remove packings (10, 11, 12 and 13) from housing (7).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1. Bearing
2. Lever
3. Pin
4. Screw
5. Retainer
6. Connector
7. Housing
8. Packing
9. Packing
10. Packing
11. Packing
12. Packing
13. Packing
14. Piston
15. Packing
16. Housing
17. Retaining Ring
18. Retainer
19. Washer
20. Screw

Figure 6-39. Inlet Guide Vane Actuator Assembly (T53-L-15/701) - Exploded View

CHAPTER 7

CLEANING, INSPECTION, AND REPAIR

SECTION I

CLEANING

-1. GENERAL.

-2. Thoroughly clean and inspect all parts that are emoved from the engine. Check for loose and miss- g parts, and note any damage or excessive wear. epair parts when necessary, but avoid excessive epair not warranted from a safety of flight stand- oint. Replace parts that cannot be returned to ser- ice.

-3. GENERAL CLEANING INSTRUCTIONS.

-4. The primary purpose of cleaning is to remove ontaminants that might conceal minor cracks and efects which, if not detected, could eventually lead o failure. Under normal circumstances, engine omponents will be cleaned only as necessary to per- rm required inspection and repair. After the use f alternate and/or emergency fuels, cleaning of the ternal hot end parts is required to remove the lead ide deposits. These deposits, if not removed, ould be detrimental to engine life and performance. he cleaning methods given in this section are ade- uate for field maintenance.

-5. PRECAUTIONS. The choice of any particular leaning agent or process will depend upon the engine rt to be cleaned and the type of contaminants to be moved. Observe the following precautions for all eaning operations.

CAUTION

Take particular care in selecting cleaning method to ensure that anodizing or dichromating is not removed from surfaces. Do not use caustics on aluminum, magnesium, ceramic-coated, SAC-coated, aluminized, painted, nitrided, or carburized parts.

a. Wear rubber gloves, boots, apron or coveralls, d face shield or goggles when working with or near vents.

b. Use the least toxic cleaning materials avail- e that will satisfactorily accomplish the work.

c. Perform all cleaning operations in a well ven- ted area.

d. Treat accidentally spilled acid immediately, g a sufficient quantity of water or by following ufacturer's prescribed instructions.

e. Ensure that adequate fire fighting and safety ipment is conveniently located and readily avail- e to all personnel.

f. Do not smoke or expose a flame within 50 feet of cleaning area.

g. Ensure that vapor-degreasing, solvent-immersion, and vapor-blasting solutions are thoroughly removed from parts after cleaning. Drycleaning solvent may remain on parts after cleaning, provided that the solvent is free of contamination.

h. Do not use a steel brush for any scrubbing operation. Use a stiff-bristle fiber brush.

7-6. VAPOR-DEGREASING. Vapor-degreasing, using heated trichloroethylene, Type II (item 113, table 2-2), or perchloroethylene (item 85, table 2-2), will remove oil, grease, and sludge. The hot vapor condenses on metal surfaces, liquefies, and carries away the oil, grease, and sludge. Parts may be flushed while held in the vapor.

CAUTION

This process used only on unpainted metal parts or aluminum-painted steel parts.

a. Fill degreaser with trichloroethylene or perchloroethylene to approximately 4 inches above the heating coils.

b. Heat to an operating temperature of 188°F for trichloroethylene or 250°F for perchloroethylene.

NOTE

Do not use insulated basket when performing following step c., unless insulation material is resistant to degreaser solvent.

c. Place parts in a basket and lower basket into degreaser tank at the rate of approximately 10 feet per minute, allowing vapors to condense.

d. Allow parts to remain in vapor until they have reached the temperature of the vapor. When vapors cease to condense on parts, direct the spray from the nozzle at the parts; hold tip of nozzle below vapor level.

CAUTION

To prevent corrosion, do not remove parts from solvent vapors until they have reached the temperature of the vapor. Parts removed from vapor zone will dry immediately because of the heat of the metal and volatility of the solvent.

e. Raise basket at the rate of approximately 10 feet per minute maximum, and allow parts to drain and dry completely while holding basket in area above vapor level.

f. If further degreasing is required, allow parts to cool and repeat the degeasing procedure.

CAUTION

Vapor-degreased, noncorrosion resistant parts that have breaks in their surface finishes are highly susceptible to corrosion even in a moderately dry atmosphere. When parts are not to be processed further, immediately treat them with corrosion-preventive compound (item 21, table 2-2) after vapor-degreasing.

7-7. SOLVENT IMMERSION. In solvent-immersion cleaning method, carbon removing compound (item 12, table 2-2) is used to remove carbon, gum, grease, and other surface contaminants (except rust and corrosion) from all steel and stainless steel parts.

CAUTION

Do not clean enamel finishes with carbon removing compound. Such finishes are attacked by this compound.

WARNING

Ensure that cleaning area is well-ventilated. Operators should wear protective clothing and goggles. If carbon removing compound comes in contact with skin, eyes, or clothing, flush area with running water.

a. Remove all loose grease, dirt, and oil by vapor-degreasing.

b. Fill cleaning tank with carbon removing compound (item 12, table 2-2); then add 2-inch water seal to prevent evaporation of carbon removing compound.

c. Immerse parts in carbon removing compound, below water seal. Allow parts to soak for as long as necessary to remove contaminants.

d. Raise parts from tank and allow to drain.

e. Rinse parts in cold water to remove foreign deposits; then rinse in hot water.

f. Allow parts to air dry.

7-8. **DRYCLEANING SOLVENT. All metal parts may be cleaned with drycleaning solvent (item 28, table 2-2). This method is suitable for removing heavy oil and grease deposits from most parts, including flexible hoses and carbon oil seals.**

WARNING

Avoid prolonged inhalation of solvent vapors. Wear rubber gloves and use hand-cream to prevent contact with skin.

CAUTION

Drycleaning solvent solution shall be changed periodically to prevent contamination.

Do not use a wire brush when performing following step a. Do not brush carbon seals.

a. Immerse parts in tank containing solvent and scrub with a stiff-bristled fiber brush.

NOTE

In a spraying booth, parts may be cleaned with atomized drycleaning solvent under an air pressure of 60 to 90 psi. Spray a second time to remove residue loosened by scrubbing.

b. Dry the parts, using moisture-free compres air.

c. Cover tank when not in use.

NOTE

Drycleaning solvent will leave an oil film that will protect steel parts from corrosion for a short period of time.

7-9. VAPOR-BLASTING (LIQUID HONING). Vapo blasting is an abrasive method used to clean co tor parts. Ensure that metal is not removed durin cleaning and that cooling slots, holes, ridges, and overlap areas do not become clogged with grit. U abrasive grit (item 2, table 2-2).

CAUTION

Vapor-blasting shall not be used on magnesium or aluminum parts, or on parts having a ceramic coat or other form of coating. Compressor rotor blades shall not be vapor-blasted.

Protect critical diameters and other finished surfaces with tape (item 105, table 2-2). A separate cleaning unit shall be used to clean parts that have lead contamination. Do not use this cleaning unit for any parts that do not have lead contamination.

a. Vapor-degrease parts.

b. Place parts in cleaning unit and arrange i positions suitable for blasting.

NOTE

When vapor-blast slurry is new, cleaning will be faster and cleaned surfaces slightly rougher. As the abrasives in the slurry are reused, natural wear creates finer sizes that clean more slowly and leave smoother surfaces.

Optimum nozzle distance is 1-1/2 to 2-1/2 inches from parts to be cleaned.

c. Using vapor-blast slurry at pressure of 40 psi nozzle with 1/4 inch exit opening, direct vapor- d stream back and forth across surfaces of parts g cleaned.

d. Remove parts from cleaning unit and throughly e in cold water.

WARNING

Because of the toxicity of some deposited material, keep both part and brush wet with soap and water to prevent dust from becoming airborne.

CAUTION

Do not scrub parts with a steel brush in following step e.

. Remove all remaining contaminants by hand- bbing with a stiff-bristled fiber brush.

Rinse parts in a running water bath heated to o 212°F to remove loose particles that may re- from vapor-blasting.

. REMOVING FINGERPRINTS FROM MACHINED ACES AFTER CLEANING. Fingerprints shall be ved from all machined surfaces to prevent cor- n.

Immerse previously cleaned parts in corrosion- ntive fingerprint remover (item 42, table 2-2). te solution for a minimum of 2 minutes.

CAUTION

When removing parts from fingerprint remover in following step b., do not touch the machined surfaces.

Remove parts from fingerprint remover and using drycleaning solvent (item 28, table 2-2).

If parts are not to be reassembled within a period of time, coat parts with lubricating oil 3 or 64, table 2-2), cover all unprotected s with caps, plugs, or suitable covers. Pack- ponents individually in a plastic bag.

7-11. CORROSION PROTECTION AFTER CLEANING. Unprotected metal surfaces of components which have been cleaned and are to be stored will be preserved and protected against corrosion in accordance with paragraph 7-10, step c.

7-12. CLEANING OF NONRIGID HOSES. Clean hoses and fittings with trichloroethylene (item 113, table 2-2) and dry thoroughly. Blow out hoses with low-pressure (25 to 40 psi) compressed air, when available, to ensure that hoses are free from obstructions and completely dry.

7-13. SPECIFIC CLEANING INSTRUCTIONS.

7-14. Detailed cleaning procedures for specific engine components are given in paragraphs 7-15 through 7-20. Cleaning procedures for other assemblies and detail parts are given in paragraph 7-21.

WARNING

Do not use cleaning solvent (item 28, table 2-2) to clean interior or exterior of engine.

7-15. CLEANING AIR INLET AREA INLET GUIDE VANES, AND COMPRESSOR ROTOR BLADES. The compressor should be cleaned whenever engine performance decreases excessively, whenever exhaust gas temperature increases steadily during normal operation, when the engine has been operating in areas where air is salt-laden, or when the engine has been subjected to contamination with fire extinguishing agent other than CO_2. Cleaning may be accomplished with the engine installed in the aircraft.

CAUTION

Fire extinguishing agent bromochloromethane (CB) is a toxic, corrosive agent and dilution with water increases its corrosive effect on metal. If the engine has been subjected to CB, immediately purge the exposed engine and airframe surfaces with clean, dry air and wash with dry cleaning solvent (item 28A, table 2-2). Clean engine compressor using dry cleaning solvent method only.

WARNING

Avoid inhalation of Bromochloromethane (CB) fumes. If contact is made with skin or eyes, immediately flush with running water. Then wash thoroughly with soap and water.

CAUTION

Ensure removal of accumulations of dirt conforming to the contour of the air inlet. If aircraft has flown in a loose grass environment, perform grass blockage inspection. (Refer to paragraph 12-37.)

Allow engine to cool for a minimum of 45 minutes prior to performing cleaning.

a. Prior to cleaning the engine, the following must be accomplished.

(1) Disconnect fuel control pressure-sensing line from inlet housing. Cap inlet housing fitting with cap, AN929-4, and seal pressure-sensing line with plug, AN806D4.

(2) Shield the starter-generator by placing a rubber sheet (approximately 6 by 8 inches) between the starter-generator and bleed band ports.

(3) Manually position engine anti-icing air switch in cockpit to the CLOSED position.

(4) On T53-L-7 Series engines, block customer bleed air supply at customer bleed air port. On T53-L-15/701 Series engines, shut off air supply by placing air supply valve switch(es) in OFF position.

(5) Disconnect pressure hose (4, figure 1-27) at the air diffuser. Cap diffuser fitting with cap, AN 929-6D.

(6) If a source of metered compressed air is available, the engine bleed band can be closed to permit more thorough cleaning of the centrifugal compressor stage and to preclude cleaning solution from spraying out the air-bleed ports.

(a) Disconnect pressure hose from fuel control to air-bleed actuator at union (18, figure 5-81). Cap union with cap, AN929-4.

(b) Connect source of metered compressed air to pressure hose (4, figure 1-27) using union, AN815-6, or similar attachment.

(c) Supply 30 to 40 psi metered air pressure.

NOTE

Do not exceed 60 psi maximum air pressure.

(d) When air pressure is applied, the actuator should close the bleed band. Leave bleed band closed and proceed with engine cleaning.

(7) Connect external power source, if available. If not, use air-frame battery.

(8) Place propeller in the FEATHER position and block the propeller to prevent rotation.

b. Perform the following if the engine is to be cleaned with water-soluble cleaner (item 120A, table 2-2) or dry cleaning solvent (item 28A, table 2-2).

(1) (Deleted)

(2) Ensure that fuel is in the OFF position.

c. Cleaning of air inlet area and inlet guide vanes.

(1) Swab air inlet area and inlet guide with a soft cloth, moistened with the cleaning to be used to clean the compressor to loosen taminants.

(2) Use a stiff fiber (not wire) brush to hard-packed or caked dirt.

(3) Rinse air inlet area and inlet guide with water and reinspect. If signs of contam are present, repeat preceding steps (1) through and re-rinse air inlet area and inlet guide vanes.

(4) Remove and clean fuel control sensing element.

d. Cleaning of compressor.

NOTE

At an ambient temperature below 35° F (2° C), use a 40 percent methanol (item 74, table 2-2) and 60 percent water mixture in lieu of fresh water. This will prevent freezing.

After cleaning using any of the following methods, a corrosion-resistant, water-displacement solution shall be applied on compressor blades and vanes. Preserve the blades and vanes with rust inhibitor and preservative (item 91A, table 2-2) as directed in paragraph 3-17.

CAUTION

Cleaning solution or water must sprayed into the engine inlet while the engine is running. A stream of liquid directed against the compr or blades at operating RPM can cau blades to oscillate at a high frequency. This can result in fatigue damage to the blades and contribute to subsequent blade failure.

(1) Preferred Method - Cleaning with soluble cleaner (item 120A, table 2-2).

NOTE

Water-soluble cleaner (item 120A, table 2-2) is non-flammable. No special fire safety precautions need be taken.

(a) Any type of pressure-spray may be used to apply water-soluble cleaner table 2-2), provided the cleaner and water mixed at a ratio of one part cleaner to four water and the spray nozzle is adjusted to mum flow of approximately 2-1/2 gallons

(b) Mix 1/2 gallon of cleaner with of water and pour into sprayer.

(c) Motor engine while spraying cleaning tion evenly into inlet housing. Direct spray com- tely around engine inlet housing to ensure uniform lication to all compressor vanes.

CAUTION

Do not operate starter for more than 40 seconds. No more than three runs may be made during any 60-minute period. Three minutes of cooling time between each starter use is required.

(d) With engine static, spray inlet housing ts and areas leading to compressor section; sev- l spray applications may be required. The drying- rate governs the time interval between applications.

(e) Motor engine while spraying clean, h water evenly around engine inlet area. A mini- of 2-1/2 gallons of water shall be used.

(f) Inspect compressor for cleanliness. at cleaning procedure if necessary.

CAUTION

Cabin heat line must be connected prior to starting engine.

(g) Remove compressed air source, if , and propeller block. Following a 3-minute time d to allow for starter coding, start engine, and te for a maximum of 2 minutes at 85 percent N1 anti-ice ON to dry out; then shut down. On T53- /701 Series engines, run engines with air-con- ing on MAX and side hatches open until air con- ing system is purged of fumes from cleaning t. Shut down engine and inspect compressor for liness. Repeat cleaning procedure if necessary.

(h) Remove protective caps, clean capped , and reconnect hoses. Remove rubber sheet ding starter-generator.

(2) Alternate Method - Cleaning with dry ing solvent (item 28A, table 2-2), and water

NOTE

When using dry cleaning solvent (item 28A, table 2-2), it is recommended that the bleed band actuator be covered with a plastic bag or suitable substitute. This will prevent contamination of the bleed band actuator O-rings.

(a) Motor engine with starter and spray a of 1 to 2 pints of dry cleaning solvent (item table 2-2) evenly through all sections of inlet

CAUTION

Do not operate starter for more than 40 seconds. No more than three runs may be made during any 60-minute period. Three minutes of cooling time between each starter use is required.

(b) Let engine stand for one hour minimum to permit solvent to loosen dirt.

CAUTION

A clogged combustor drain valve/line may allow puddling of solvent in the combustor, causing hot starts.

(c) Motor engine and spray clean, fresh water evenly through all sections of inlet housing. A minimum of 2-1/2 gallons of water shall be used.

(d) Remove compressed air source, if used, and propeller block.

(e) Start engine and allow to run for 2 minutes maximum with anti-ice on to dry out; then shut down. On T53-L-15/701 Series engines, run engines with air-conditioning system on MAX and side hatches open until air-conditioning system is purged of fumes from cleaning solvent. Shut down engine and inspect compressor for cleaniness. Repeat cleaning procedure if necessary.

(f) Remove plastic bag from bleed band actuator and remove heat-resistant material from between bleed band ports and starter-generator.

(g) Remove protective caps, clean capped ports, and reconnect hoses.

(3) (Deleted)

(4) Alternate Method - Cleaning with water if water-soluble cleaner (item 120A, table 2-2), or dry cleaning solvent (item 28A, table 2-2), are not available.

(a) (Deleted)

(b) Motor engine and spray clean fresh water into all sections of inlet housing. A minimum of 2-1/2 gallons shall be used.

(c) Remove compressed air source, if used, and propeller block. Remove protective caps clean capped ports, and reconnect hoses.

(d) Start engine and operate at 85 percent N1 with anti-ice ON for 2 minutes to dry out; then shut down and inspect compressor for cleanliness. Repeat cleaning procedure if necessary.

7-16. CLEANING OF LUBE OIL FILTER ASSEMBLY. Proceed as follows:

a. If, upon removal of filter cover assembly (14, figure 6-35, excessive amount of chips are noted (refer to paragraph 4-6), clean filter elements as follows:

WARNING

rm this cleaning operation in a well-
lated area.

stall filter elements on a shaft having the
ter as the filter element orifice.

mmerse shaft and elements in an agitating
rco Compound (item 116, table 2-2) at am-
erature or drycleaning solvent (item 28,
until all contamination is removed.

inse under running hot water or in a tank
water. Blow clean dry air through filter
t 100 psi maximum.

ted)

LEANING OF ELECTRICAL CABLE
Y AND EXAHUST THERMOCUPLE AS-
Clean electrical cable and exhaust thermo-
emblies by wiping with a clean, lint-free
ly dampened with dry cleaning solvent
able 2-2). After cleaning, wipe with a
, lint-free cloth to remove residual solvent.

CAUTION

t immerse cable or thermocouple
blies in solvent. Solvent may cause
nction of thermocouple probes and
ioration of electric cable and ther-
uple internal wiring insulation.

SHING FUEL CONTROL ASSEMBLY ON
roceed as follows:

NOTE

de a clean container for drained fuel.

nnect main and starting fuel hoses at
nnection. Connect drain hoses to hose

nect wiring harness to ignition unit.

de source of clean fuel (item 47, table
control inlet port.

CAUTION

revent damage to starter, do not
d starter limits when motoring
ngine.

r engine.

e. Open power and condition levers while motoring engine.

f. Check container for contamination of flushing fuel.

g. Replace fuel control if it cannot be flushed clean in three 30-second motoring attempts.

7-18. CLEANING OF IGNITER PLUGS (T53-L-7/7A Engines). Proceed as follows:

a. Place igniter plugs in a perforated or wire mesh corrosion-resistant steel container.

WARNING

Provide adequate ventilation around bath. Wear rubber gloves to protect hands from chemicals as skin will be harmed by prolonged contact. If inhaled deeply, the solution may be injurious to the lungs.

NOTE

Do not permit copper, bronze, brass, or aluminum objects to contact solution. Do not apply heat to this solution as mixture will result in a solution temperature of approximately 180°F when first mixed. Use solution only once.

b. Immerse parts in a solution containing, by volume, four parts Magnus 61C (item 69, table 2-2), one part Magnus 751 (item 70, table 2-2), four parts Oakite Rust Stripper (item 81, table 2-2), and 14 parts water for 30 to 60 minutes.

c. Remove parts from solution and spray-rinse with clean, cool water.

d. Rinse all parts in drycleaning solvent (item 28, table 2-2) and dry with compressed air.

7-19. CLEANING OF STARTING FUEL NOZZLES (T53-L-7/7A Engines). Proceed as follows:

a. Place all parts in perforated or wire mesh corrosion resistant steel container.

WARNING

Provide adequate ventilation around bath. Wear rubber gloves to protect hands from chemicals as skin will be harmed by prolonged contact. If inhaled deeply, the solution may be injurious to the lungs.

NOTE

Do not permit copper, bronze, brass, or aluminum objects to contact solution. Do not apply heat to this solution as mixture will result in a solution temperature of approximately 180°F when first mixed. Use solution only once.

b. Immerse parts in solution containing, by volume, four parts Magnus 61C (item 69, table 2-2), one part Magnus 751 (item 70, table 2-2), four parts Oakite Rust Stripper (item 81, table 2-2), and 14 parts water for 30 to 60 minutes.

c. Remove parts from solution and spray rinse with clean, cool water.

NOTE

If necessary, lightly polish parts with No. 500, wet or dry, emery cloth to remove deposits or stains.

d. Rinse all parts in drycleaning solvent (item 28, table 2-2) and dry with compressed air.

e. Using a razor blade, clean slots in distributor.

7-20. CLEANING OF FUEL VAPORIZERS (T53-L-7/7A Engines). Proceed as follows:

a. When engine has been operated on alternate or emergency fuel or when coke deposits are excessive, clean fuel vaporizer assemblies as follows:

(1) Fully immerse fuel vaporizer in drycleaning solvent (item 28, table 2-2). Soak as long as necessary to soften carbon deposits.

CAUTION

Do not use a stainless steel brush in following step (2). Do not damage ceramic coating on fuel vaporizer.

(2) Thoroughly clean fuel vaporizer w stiff-fiber brush giving particular attention t of vaporizer exit legs. Dry with dry compr air.

(3) Rinse with cold, then hot water.

(4) Dry with clean, dry compressed air.

b. Clean divider as follows:

(1) Loosen carbon and other foreign on divider, using stiff-fiber brush.

(2) Remove carbon by soaking divider chloroethane (item 114, table 2-2) for 5

(3) Dry divider with compressed air.

7-21. CLEANING OF MAIN FUEL MANIFO L-7/7A Engines). Proceed as follows:

a. Flush main fuel manifold, inside and drycleaning solvent (item 28, table 2-2). Air

b. Clear plugged fuel metering injectors verse flushing with drycleaning solvent (item table 2-2). Air-dry.

7-22. CLEANING OF ENGINE COMPONENTS 7-1 lists the correct cleaning methods to be specific detail parts and assemblies not spe paragraphs 7-15 through 7-20. The table the engine into subassemblies and detail pa special cleaning instructions needed are pr table 7-1.

WARNING

When handling combustion chamber nal parts that have been exposed to containing tetraethyl lead, ensure that the by-product (poisonous lead oxide) not inhaled or taken into the body thr cuts or other external openings. If dental exposure occurs, drench affect area with large amounts of clean wat and obtain immediate medical atten

Table 7-1. Cleaning of Major Assemblies and Detail Parts

NAME	CLEANING PARAGRAPH	SPECIAL INSTRUCTIONS
Miscellaneous Hardware (Bolts, Nuts, Brackets)	7-6 or 7-8	Clean external threads with fiber brush and flush. Dry with moisture-free compressed air
Gears	7-6 or 7-8	Dry with moisture-free compressed air
Ball and Roller Bearings	7-6 or 7-8	Dry with moisture-free compressed air. Coat with lubricating oil (item 63 or 64, table 2-2). Seal in plastic bag
INLET HOUSING ASSEMBLY		
Inlet Housing	7-8	
All Other Parts	7-8	
ACCESSORY DRIVE GEARBOX ASSEMBLY		
Accessory Gearbox Housing	7-8	
Accessory Gearbox Cover	7-8	
Gearbox Seals	7-8	
Fuel Control Gearshaft Splines	7-8	
All Other Parts	7-6 or 7-8	
REDUCTION GEAR ASSEMBLY, SUN GEARSHAFT, TORQUEMETER VALVE AND CYLINDER		
All Parts	7-6 or 7-8	
PROPELLER SHAFT REAR BEARING SUPPORT		
All Parts	7-6 or 7-8	
Accessory Drive Gearshaft Spline (female)		Brush with drycleaning solvent. Dry with clean dry air
OVERSPEED GOVERNOR AND TACHOMETER DRIVE SUPPORT AND GEAR ASSEMBLY		
All parts	7-6 or 7-8	
COMPRESSOR ROTOR ASSEMBLY		
All parts	7-6 or 7-8	Brush heavy deposits. Do not clean positive contact seals
COMPRESSOR AND IMPELLER HOUSING ASSEMBLY		
Compressor Vanes	7-6 or 7-8	
All Other Parts	7-8	
COMBUSTOR TURBINE ASSEMBLY		
Combustion Chamber Housing	7-6 or 7-8	If necessary, use solvent immersion method. (Refer to paragraph 7-7.)
Combustion Chamber Liner	7-6	If necessary, use solvent-immersion method. (Refer to paragraph 7-7.) If further cleaning is required use vapor-blasting (liquid honing) method. (Refer to paragraph 7-9.)

Table 7-1. Cleaning of Major Assemblies and Detail Parts (Cont)

NAME	CLEANING PARAGRAPH	SPECIAL INSTRUCTIONS
COMBUSTOR TURBINE ASSEMBLY (Cont)		
Turbine Nozzle Assembly	7-6	If necessary, use vapor-blasting (liquid honing) method. (Refer to paragraph 7-9.)
Power Turbine Cylinder	7-6	If necessary, use vapor-blasting (liquid honing) method. (Refer to paragraph 7-9.)
Power Turbine Rotor and Bearing Housing	7-6	On seal, use drycleaning method only. (Refer to paragraph 7-8.)
Fuel Vaporizers (T53-L-7/7A Engines only)	7-7	Fully immerse fuel vaporizers for as long as necessary to soften carbon deposits. Thoroughly clean with a stiff-fiber brush, giving particular attention to insides of vaporizer exit legs. Do not use stainless steel brush. Dry with clean, dry compressed air
Exhaust Diffuser	7-8	If necessary use solvent immersion method (paragraph 7-7)
Flow Divider (T53-L-15/701 Engines only)	7-7	Loosen carbon and other foreign material on divider, using a stiff-fiber brush. Remove carbon by soaking in trichloroethane (item 114, table 2-2) for 5 minutes. Dry with clean, dry compressed air
All Other Parts	7-6 or 7-8	If necessary use solvent immersion method outlined in paragraph 7-7
INTERSTAGE BLEED ACTUATOR ASSEMBLY		
All Parts	7-6 or 7-8	
GAS PRODUCER NOZZLES, ROTORS, AND ASSOCIATED PARTS		
Turbine Nozzle	7-6	A light vapor-blast using vapor-blast (liquid honing) method (paragraph 7-9) may be used, provided care is taken not to damage coating
Turbine Rotor	7-6	A light vapor-blast using vapor-blast (liquid honing) method (paragraph 7-9) may be used
All Other Parts	7-6 or 7-8	On seal use drycleaning solvent method only. (Refer to paragraph 7-8)
SECOND STAGE TURBINE SUPPORT ASSEMBLY		
All Parts	7-6 or 7-8	If necessary, use solvent immersion method (paragraph 7-7) for any aluminum painted parts
OVERSPEED GOVERNOR AND TACHOMETER DRIVE ASSEMBLY		
Housing	7-8	
Cover	7-8	
Seal	7-8	
All Other Parts	7-6 or 7-8	

SECTION II

INSPECTION

23. GENERAL.

24. A close and complete inspection is important to en-re engine life and maximum performance. Check for loose missing parts and inspect any engine component that has en worn or damaged. Inspection and repair shall be made ly where safety-of-flight is affected, or where such repair ll add to total life of part. Sound judgment must be exer-ed by inspection personnel to avoid excessive repair not rranted from safety-of-flight standpoint.

25. GENERAL INSPECTION INSTRUCTIONS.

26. All inspection procedures should be carried out in a hted, clean, dust and dirt-free room. Benches should be vered with clean dry paper to keep previously clean parts e of dirt and dust. All parts should be suitably tagged to licate necessary repair or replacement. Although parts ll require only visual inspection, a certain number re-ire use of micrometers or special gages. Deep-seated mage may be inspected by magnetic particle or fluores-nt penetrant inspection methods. Methods of inspection r specific components are stated in text.

7. INSPECTION TERMS. For definitions of inspection ms refer to table 7-2.

8 ANTIFRICTION BEARING INSPECTION. Ob-rve the following general precautions before and during ring inspection:

. Never mix bearing components. Record bearing serial mber and tag bearings.

. Do not clean bearings.

. Keep exposed bearings covered with clean paper or -free cloth.

. If replacement of bearing is indicated, do not remove bearing from wrapper until ready to installation.

. Visually inspect bearing without the aid of a magnify-glass. Inspect for the following conditions.

(1) General condition: any obvious damage, such as rust roken parts, is cause for rejection.

(2) Surface defects: noticeable defects, such as heavy pitting or spalling on the active surfaces, is cause for rejection.

(3) Foreign matter: abrasive, obstructive, or clogging substances are cause for rejection.

(4) Discoloration: bearings that are straw colored, tan, or light brown are not overheated and may continue in service. Bearings that are red-purple, purple, or blue should be replaced. The exception to this condition is the No. 2 and 3 positions bearings (1-300-013 and 1-300-176) which are made of M-50 alloy. If these bearings are red-purple, purple, or blue and have a slight luster, they are acceptable for futher use. If they are gray-blue and are scaled or show a dull matt, they should be rejected.

7-29. GEARS AND SPLINED PARTS INSPECTION. (Refer to Fig. 7-1.) Use the following procedure:

a. Using a four-power magnifying glass, inspect each internal and external spline visually for wear and/or fretting corrosion. Light wear or fretting is acceptable, provided it does not exceed inspection limits given in following Step b.

b. Inspect spline wear steps or fretting corrosion maximum dept. Wear and/or fretting corrosion maximum depth shall not exceed 0.007 inch on external spline teeth, except as specified in detail inspection paragraphs. If limits are exceeded, replace spline parts.

7-30. MAGNETIC-PARTICLE INSPECTION. (Refer to Table 7-3.)

NOTE

Inspection by magnetic-particle method is not required unless specified in the detail inspection paragraphs.

The magnetic-particle inspection method, Military Specification MIL-I-6868, detects cracks, voids, pits, subsurface holes, and other discontinuities. This method is applicable only to ferro-magnetic steel and has no effect on nonferrous materials. The magnetic-particle inspection shall be performed using the nonfluorescent wet-residual or

Table 7-2. Inspection Terms

TERM	DEFINITION
Abrasion	Roughened surface, varying from light to severe, caused by presence of foreign material between moving parts
Banding	Parallel bands of discoloration resulting from oil varnish or oxide film formation on bearing surface. Generally caused by high-temperature bearing operation
Bend	Distortion in a part. (Differs from local change in conformation.) Caused by severe heat or excessive force
Blister	Raised portion of a surface, usually where the surface has separated from the base, caused by poor original bond or excessive heat or pressure. Generally found on surface-treated parts, such as plated or painted surfaces
Break	Separation of a part into two or more pieces; a discontinuity of grain structure which makes part unusable due to transverse shock or pressure, overloading; repeated reversal of stress application
Brinelling, False	Occurs at rolling contact surfaces of bearing races resulting from continuous nonrotational shaft oscillation. Does not occur when bearing is in operation. Recognized by presence of a series of shallow indentations in loaded side of the race at each roller position. Indentations are usually polished or satin-finished in appearance
Brinelling, True	Occurs at rolling contact surfaces of bearing races caused by high shock loads leaving a permanent impression of the roller or ball in the race contact surface. Result of shock loads when bearing is stationary. Recognized by the presence of shallow, smooth indentiations in the race at each ball or roller position on loaded side of the bearing
Brittleness	Lack of resiliency; easily broken, particularly by shock due to very low temperature of part; high temperature as in burning of metal
Buckling	Large scale deformation of part contour caused by pressure or impact from foreign object, unusual structural pressures, excessive localized heating, or any combination of these causes
Burn	Loss of metal or deterioration of granular cohesion due to excessive heat
Burnishing	The smoothing of a metal surface by mechanical action, but without loss of material due to excessive heat. Generally found on plain bearing surfaces. Surface discoloration is sometimes present around outer edges of the burnished area **NOTE** Normal burnishing from operational service is not detrimental if coverage approximates the load carrying surfaces and if there is no evidence of overheating
Burr	A rough edge or sharp projection caused by impact from foreign object or poor machining
Cage Failure	Indicated by cracks, breaks, or severe wear on bearing cage working surfaces caused by rapid acceleration and breakdown in lubrication

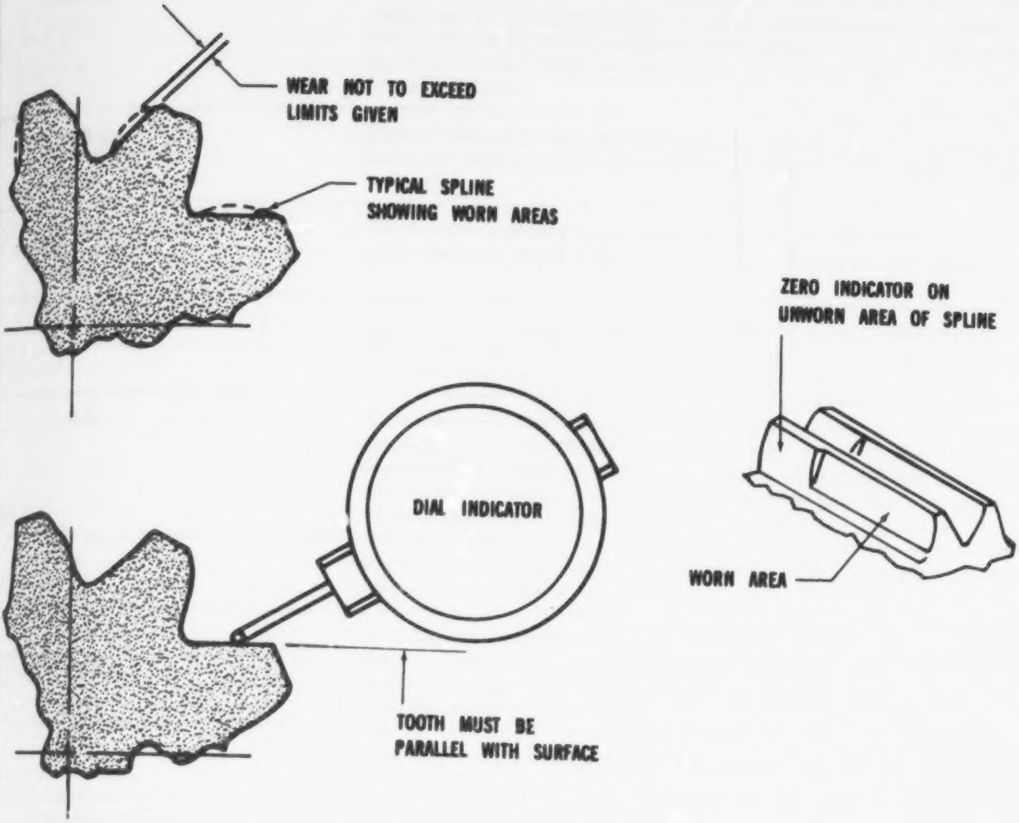

WEAR NOT TO EXCEED LIMITS GIVEN
TYPICAL SPLINE SHOWING WORN AREAS
ZERO INDICATOR ON UNWORN AREA OF SPLINE
DIAL INDICATOR
WORN AREA
TOOTH MUST BE PARALLEL WITH SURFACE

Figure 7-1. Gears and Splined Parts Inspection

Table 7-2. Inspection Terms (Cont)

TERM	DEFINITION
Chipping	Breaking away of small metallic particles caused by heavy impact from foreign object
Coking	Hard, black, brittle carbon deposits formed of soot, oil or fuel subjected to cracking process. Fuel characteristics. Adherence is primarily on metal surface whose temperature is approximately 1500°F and is washed with fuel. In case of seals, it is caused by oil residue
Coking, External (Common Occurrence)	Finger-like deposits extending along and away from fuel vaporizer exit leg; also forms on liner end and baffles. Same as for coking
Coking, Internal (Rare Occurrence)	Hard coke deposits inside fuel vaporizer tubes, which restrict fuel flow and cause vaporizer burnout. Same as for coking
Corrosion	Surface discoloration, oxidation, rust, or metal removal caused by chemical action caused by improper or inadequate protective procedures or use of improper cleaning materials
Crack	Fissure or break in material due to severe stress from overloading or shock; possible extension of a scratch. Deformation-type crack: Displays a definite opening or significant separation of the material. Nondeformation-type crack: Does not show a discernable separation of material (e.g. hairline cracks)
Dent	A small smoothly rounded depression caused by a sharp blow or excessive pressure
Distortion	A change from original shape caused by severe heat
Electrolytic Action	Surface breakdown caused by galvanic action between two dissimilar metals
Erosion	Wearing away of metal caused by hot gases, corrosive liquids, or grit
Fatigue Failure	Failure caused by progressive yielding of material at a point subjected to concentration of reversing or fluctuating stress due to an inclusion, a nick, scratch, or other surface abrasion which forms a stress raiser. Reversal or fluctuating stress concentrating at point of damage caused material to yield and separate. Continued application of stress causes separated faces to burnish each other and accelerates the growth of the separation. There will be evidence of several lines, more or less concentric. The center (or focus) of the lines indicates the origin of the failure
Flaking	Loose particles of metal or evidence of surface covering removal caused by imperfect bond or severe load
Fracture	(See break)
Fretting	Recognized by discoloration of contacting parts resulting from slight movement between two contacting surfaces resulting in removal of original surface material
Frosting	A great number of minute indentations caused by foreign matter in lubricating oil

Table 7-2. Inspection Terms (Cont)

TERM	DEFINITION
Galling	Recognized by the presence of metal from one part remaining attached to another as a result of localized breakdown of lubrication causing friction, intense heat, and part fusion. Occurs at poorly lubricated surfaces that are in sliding contact
Glazing	Hard, glossy surface on plain bearing areas (sometimes a desirable condition) caused by pressure, oil, and heat in combination
Gouging	Removal of surface metal, typified by rough and deep depressions caused by protruding object or misalignment
Grooving	Grooving is found on rolling contact surfaces of angular contact ball bearings resulting from bearing thrust load in the wrong direction. This causes the ball to ride on the edge of the race groove causing race surfaces to deteriorate
Heat Oxidizing	Characterized by a discoloring film due to high temperature operation. Color varies from yellow to brown and blue to purple
Inclusion	Foreign matter enclosed in metal which occurs during initial manufacture
Indenting	Cavities with smooth bottoms and sides due to loose or foreign particles rolling between rotating elements of a bearing. Occurs on rolling contact surfaces of bearing components
Metalization	Small metal beads adhering to the surface of a part caused by overheating of a part until the metal reaches a molten state, small particles of which are depositied on adjacent part by centrifugal force or moving air
Nick	A sharp bottomed depression which usually has rough edges raised slightly above the surface of the part caused by forceful contact with the sharp edge of a foreign object
Peening	Flattening or displacing of metal by repeated blows (usually from a smaller, harder object) usually caused by loose adjacent part(s). Rarely caused by foreign object
Pickup	Transfer of one material onto another due to insufficient lubrication, unbroken edges of press-fitted parts, and seizure of rotating parts during operation
Pitting	Chemical pitting: Oxidation of surface or electrolytic action. Mechanical pitting: Chipping of loaded surfaces caused by improper clearances and overloading and by pressure of foreign material. Characterized by a discoloring film
Pitting, Corrosion	Corrosion pitting on bearings is distinguished under magnificatio by the presence of shallow, irregularly shaped pits having ragged edges due to small drops of corrosive material attacking the exposed surface of a bearing component. The pits are widely distributed and include portions outside the rolling contact surface and are usually reddish in color
Pitting, Fatigue	Irregular, relatively deep cavities in rolling contact area of all ball or roller bearings caused by continuous high stress or temporary abnormal conditions which cause high stress in the rolling contact area. Pitting concentrated at the ends of rollers or in the paths followed by ends of rollers is indicative of misalignment

Table 7-2. Inspection Terms (Cont)

TERM	DEFINITION
Roller End Wear	Indicated by irregular, sharp edges at bearing roller ends caused by misalignment of bearing due to excessive strain elsewhere in the engine
Scoring	Deep scratch following path of part travel resulting from localized lubrication breakdown between sliding surfaces
Scraping	A furrow caused by rubbing with any hard or rough pointed object
Scratch	A very shallow furrow or irregularity, usually longer than wide due to movement of a sharp object across the surface
Seizure	Fusion or binding of two adjacent surfaces preventing continued movement due to inadequate lubrication and heat expansion
Spalling	Sharply roughened area characterized by progressive chipping or peeling of surface material (dissimilar to flaking). Surface crack, inclusion, or similar surface injury that causes a progressive breaking away of the parent material
Staining	Staining occurs on any portion of the bearing component surface exposed to corrosive liquid attacking the exposed surface of bearing component. Recognized by the presence of discolored areas where the original area, within the surface, appears intact. Early stages appear black in color; advanced stage, slightly reddish
Stress Failure	Failure of metal caused by compression, tension, shear, torsion, or shock Compression: Action of two opposed forces that tend to squeeze a part Tension: Action of two directly opposed forces that tend to stretch a part Shear: Action of two parallel forces acting in opposite directions Torsion: Action of two opposed forces around a common axis Shock: Instantaneous application of any stress
Stripped Thread	Thread of a nut, bolt, or screw damaged by tearing away part of thread caused by improper installation, thread size or thread lead. Excessive loading or torque
Tear	Parting of parent material caused by excessive tension or shearing caused by an external force
Unbalanced	Unequal distribution of weight about the axis of a rotating part due to improper machining, uneven wear, or deposits of foreign matter such as oil sludge or carbon
Varnishing	Characterized by a discoloring film ranging from brown to black; due to lubricant breakdown with or without high-temperature operation. Found on all bearing surfaces in contact with lubricants
Wear	Slow removal of parent material. Frequently, wear is not visible to the naked eye. Caused by movement of parts while in contact. Inadequate lubrication or the presence of foreign material will accelerate this action

Table 7-3. Magnetic-Particle Inspection Requirements

PART NAME	FIG. AND INDEX	AMPERAGE AND MAGNETIZATION			METHOD	
		CENTRAL CONDUCTOR AMPS	END-TO-END AMPS	LONGITUDINAL AMP TURNS	WR	WC
Inlet Guide Vane Actuator Assembly						
Connector	6-39, 6	500/700		4000	X	
Overspeed Governor and Tachometer Drive Assembly						
Tachometer Drive Gear Assembly	6-3, 18	700/900		5000	X	
	6-4, 2	700/900		5000	X	
Tachometer Drive Gear	6-3, 30	700/900		5000	X	
	6-4, 14	700/900		5000	X	
Intermediate Gear	6-3, 36	700/900		5000	X	X
Overspeed Governor Drive Gear	6-3, 41	700/900		5000	X	
Gear Assembly	6-3, 49		700/900	5000	X	
	6-4, 36		700/900	5000	X	
Shaft	6-3, 61	700/900		5000	X	
	6-4, 48	700/900		5000	X	
Accessory Drive Gearbox Assembly						
Spacer	6-5, 41	500			X	
Reduction Gear Assembly and Sun Gearshaft						
Plate	6-22, 10	500/700		4000	X	
Plug	6-22, 25		500/700	4000	X	
Gearshaft	6-22, 32	700/900		5000	X	
Shaft	6-22, 30	1800/2000		10000	X	
Carrier	6-22, 50	1800/2000		10000	X	
Internal Gear	6-22, 34	500/700		4000	X	X
Spanner Nut	6-22, 43	500/700			X	
Lock Cap	6-22, 53	500/700		4000	X	
Combustion Turbine Assembly						
Power Shaft Bolt	3-15, 4 3-24, 5		700/900	5000	X	
Bolt	6-18, 4		500/700		X	
Power Turbine Spacer	6-18, 8	500/700		4000	X	
Power Turbine Rotor and Bearing Housing Assembly						
Seal Housing Assembly	6-14, 4 6-20, 11	500/700		4000	X	

Table 7-3. Magnetic-Particle Inspection Requirements (Cont)

PART NAME	FIG. AND INDEX	AMPERAGE AND MAGNETIZATION			METHOD	
		CENTRAL CONDUCTOR AMPS	END-TO-END AMPS	LONGITUDINAL AMP TURNS	WR	WC
Gas Producer System Components						
Retaining Ring	3-28, 4	700/900		5000	X	
houldered Stud	3-28, 8			4000	X	
tepped Stud	3-28, 9			4000		
etaining Plate	3-28, 22	500/700		4000	X	
Oil Seal Retainer	3-28, 27	700/900		5000	X	
ft Oil Ring	3-28, 24	700/900		5000	X	
ockring	3-28, 49	500/700		4000	X	
t	3-28, 50	500/700			X	
irst Stage Compressor otor Blades (T53-L-15/701)				2000	X	

continuous inspection. The equipment shall be ble of detecting harmful defects, using specified erage for particular parts. Inspect all applicable s as follows:

Prior to inspection, parts shall be free of se and foreign material.

Prior to inspection, passages that are too diffi- o clean shall be plugged with rubber or wood .

Whenever possible, circular and longitudinal tization shall be used. Maneuver part to ensure uivalent magnetic field throughout. Where ap- ble, the conductor OD shall approximate the bore ID.

Where applicable, inspect in the following se- e: low-current application, first inspection, gh current application, second inspection.

Multiple part inspection is permitted when a l conductor is used for circular magnetization. allow parts to come in contact during mag- ion, or until inspection is completed.

Whenever possible, use a central conductor as ng device during longitudinal magnetization.

Unless otherwise specified, accomplish circu- d longitudinal magnetization by using three t applications, each ranging from 0.4 to 0.5 duration. Apply wet medium during first two t applications only.

nsert parts subject to longitudinal magnetiza- o magnetizing coil so the major part axis, of long shafts, and axis of rotating parts are l with coil axis.

CAUTION

In following step i., when magnetizing the parts in multiples, limit the number of parts to prevent one part from shielding another part. Shielding parts may distort the magnetic field and give false indications. Do not stack parts.

i. Unless otherwise specified, inspect bolts by longitudinal magnetization. Bolts and studs may be magnetized in multiples, provided units are inserted within the coil, with each major part axis parallel to the axis of the coil.

j. Inspect nuts by circular magnetization unless otherwise specified. Nuts may be magnetized in multiples, provided they do not come in contact during magnetization and not until completion of inspection. Do not stack parts.

k. When inspecting blades in rotor discs, place rotor assembly inside solenoid and slosh the wet medium over the blade during the first two current applications only.

l. Parts must be demagnetized after the magnetic-particle inspection. This is accomplished by passing each part slowly through the entire length of the demagnetization coil so that the axis of rotation is parallel to the axis of the coil winding. Rotate circular parts as they are passed through the demagnetizing coil. Withdraw all parts from the demagnetizer with a straight away motion for a distance of at least 3 feet.

m. Plugged oil passages should be cleared and all parts thoroughly rinsed in drycleaning solvent (item 28, table 2-2). No magnetic material shall remain on the part. Airblast dry, or wipe with clean cloth.

n. To be sure that parts are free of magnetization, test with a magnetometer.

7-31. FLUORESCENT-PENETRANT INSPECTION.

Proceed as follows:

NOTE

Inspection by fluorescent-penetrant method is not required unless specified in the detail inspection paragraphs.

Fluorescent-penetrant inspection is a nondestructive means of inspecting nonferrous materials for cracks, laps, cold shuts, porosity, and other defects having surface openings. This method may be used on ferromagnetic parts that are complex in structure and give false indications when inspected by the magnetic-particle inspection method. Perform fluorescent-penetrant inspection in accordance with Military Specification MIL-I-6866 and the following instructions:

WARNING

Wear rubber gloves when performing the fluorescent-penetrant inspection as oil remaining on the skin may cause skin inflammation. Presence of penetrating oil on skin can be detected under ultraviolet (black) light.

a. Free all surfaces of the part to be inspected of foreign materials such as grease, heavy oil, rust, or scale that may prevent oil penetration into surface flaws and result in false indications. Remove heavy oil and grease by vapor-degreasing; remove dirt and scale by vapor-blasting or with a fiber brush, depending upon the amount of cleaning necessary. Do not polish surfaces because surface flaws would then be covered, resulting in poor indications.

b. Perform fluorescent-penetrant inspection procedure on all applicable parts, with the of the compressor rotor blades and vanes, compressor impeller assembly, and first and second stage turbine rotor blades.

(1) Immerse, spray, or brush all surface the part being inspected with Turco Fluro-Che WP167 (item 118C, table 2-2) or Turco Fluro-WP1 (item 118B, table 2-2).

(2) Allow 20 minutes for fluorescent-pen to enter any defect.

(3) (Deleted)

(4) (Deleted)

(5) Remove fluorescent-penetrant liquid surface of part by washing with warm water. washing, place part under ultraviolet light and to ensure that excessive fluorescent-penetrant liquid has been removed.

(6) Place part in a circulating hot-air maintaining a temperature of 140 to 180°F. part when completely dried.

(7) Apply fluorescent-penetrant develope Turco Fluro-Chek DD2 (item 118A, table 2-2 placing part in developer fogging chamber.

(8) Allow approximately 15 minutes for tions to develop.

(9) Examine part in a darkened enclosure under ultraviolet light. If cracks or other defe are found, mark area of defect, and tag parts discrepancy.

c. (Deleted)

-32. INSPECTION OF NONRIGID HOSES. Proceed s follows:

CAUTION

Any twisting of hoses is unacceptable. When loosening or replacing connections, always use two wrenches. Use one on the B nut and the other on the hexagonal portion of the nipple to avoid twisting the hose. (See figure 3-9.)

a. Visually inspect hoses for cuts, fraying, and hafing. Minor cuts, fraying, and chafing are re- irable (refer to paragraph 7-145); more severe mage is unacceptable and requires hose replace- ent.

b. Visually inspect fittings for nicks, burrs, and maged threads. Minor damage is repairable; vere damage requires hose replacement.

31. INSPECTION OF ENGINE COMPONENTS.

34. INSPECTION OF OVERSPEED GOVERNOR D TACHOMETER DRIVE ASSEMBLY (ORGANI- TIONAL MAINTENANCE). (See figure 6-1.) oceed as follows:

a. Inspect all parts for nicks, burrs, wear, acks, and distortion. Blend-repair as outlined paragraph 7-136.

b. Inspect threaded parts for damaged or crossed eads. Repair damaged threads as outlined in ragraph 7-137.

c. Inspect gears and splined parts for damaged th or uneven tooth wear, journal wear or damage, face damage, thread damage, and nicked or rred keyways. Replace overspeed governor and hometer drive assembly if defective.

d. Inspect filter for damage. Replace if defective.

e. Inspect tachometer drive seal for leakage. place as outlined in paragraph 8-80.

5. INSPECTION OF OVERSPEED GOVERNOR D TACHOMETER DRIVE ASSEMBLY (T53-L-7/ 15 Engines) (DS AND GS MAINTENANCE). (See re 6-3.) Proceed as follows:

. Inspect all parts for nicks, burrs, wear, ks, and distortion. Blend-repair nicks and rs as outlined in paragraph 7-136. Replace if ked or distorted.

. Inspect threaded parts for damaged or crossed ads. Repair damaged threads as outlined in graph 7-137.

. Inspect relief valve spring (11, figure 6-3) for ge.

d. Inspect gears and splined parts for chipping or flaking, excessive or uneven tooth wear, journal wear or damage, surface damage, thread damage, and nicked or burred keyways. Replace defective parts.

e. Inspect housing and liner assembly (43, figure 6-3) for damaged screw-thread inserts. Repair as outlined in paragraph 7-137.

f. Inspect bearing liners for heavy scoring or other damage. Replace liners that are scored or otherwise damaged. (Refer to paragraph 7-147.)

g. Inspect inside diameters of bearing liners. Replace any liner that has ID measuring over 1.1031 inch. (Refer to paragraph 7-147.)

h. Flow check the throttle assembly (6, figure 6-3) as follows:

(1) Install throttle assembly into handle (LTCT 2170, detail of LTCT216).

(2) Install packing, MS29561-013, on short side of union (LTCT2169 detail of LTCT216), and install union into handle.

(3) Connect union and handle to oil flow stand (LTCT313) with short hose.

(4) Supply lubricating oil (item 63 or 64, table 2-2) at 95 to 100°F and 68 to 72 psi.

(5) The flow shall be 125 to 175 cc per minute if lubricating oil (item 64, table 2-2) is used, or 119 to 166 cc if lubricating oil (item 63, table 2-2) is used.

(6) Replace throttle assembly if it does not meet flow requirements.

7-36. INSPECTION OF OVERSPEED GOVERNOR AND TACHOMETER DRIVE ASSEMBLY (T53-L-701 Engine) (DS AND GS MAINTENANCE). (See figure 6-4.) Proceed as follows:

a. Inspect all parts for nicks, burrs, wear, cracks, and distortion. Blend-repair nicks and burrs as outlined in paragraph 7-136.

b. Inspect threaded parts for damaged or crossed threads. Repair as outlined in paragraph 7-138.

c. Inspect housing and liner assembly (30, figure 6-4) for damaged screw-thread inserts. Repair as outlined in paragraph 7-137.

d. Inspect gears and splined parts for chipping or flaking, excessive or uneven tooth wear, journal wear or damage, surface damage, thread damage and nicked or burred keyways. Replace defective parts.

7-37. INSPECTION OF ACCESSORY DRIVE GEARBOX ASSEMBLY (ORGANIZATIONAL MAINTENANCE).

Proceed as follows:

a. Inspect all parts for nicks, cracks, burrs, wear, and distortion. Blend-repair nicks and burrs. (Refer to paragraph 7-136.) Replace parts that are cracked, distorted, or excessively worn.

b. Inspect threaded parts for crossed or damaged threads. Blend-repair damaged threads. (Refer to paragraph 7-137.) Request assistance from Direct Support Maintenance for replacement of screw thread insert.

c. Inspect fuel control mounting studs for looseness. Tighten or replace studs as necessary.

d. (Deleted)

Figure 7-2 deleted

Figure 7-3 deleted

Pages 7-19 and 7-20 deleted.

e. Inspect accessory drive gearbox seals for age. Replace as outlined in paragraph 8-77.

INSPECTION OF ACCESSORY DRIVE GEAR- ASSEMBLY (DS AND GS MAINTENANCE). ceed as follows:

Inspect all parts for nicks, burrs, and scratches. d-repair as outlined in paragraph 7-136.

Inspect mating flanges of accessory drive gear- for corrosion. Observe the following repair tations:

(1) Corrosion, including light pitting to a h of 0.020 inch without breakthrough or causing rnal leakage, is acceptable after repair. Pro- as follows:

CAUTION

Use care when brushing with fiber brush so as not to mar finish of nonaffected surrounding parts.

(a) Refinish according to steps aA. through f paragraph 7-143.

(b) Complete refinishing according to step paragraph 7-143.

(2) Corrosion, with pitting greater than 0.020 in depth but not causing external leakage or ibility of material fallout, should be repaired rding to paragraph 7-143 instructions but using erred Method - epoxy sealant application.

(3) Corrosion, creating external leakage or a bility of material fallout, is nonrepairable and se for part replacement.

Inspect all threaded parts for damaged threads. r damaged threads as outlined in paragraph 7- Replace parts having threads damaged beyond r.

Visually inspect all parts for cracks, distor- and excessive wear. Replace all cracked, dis- , or excessively worn parts.

Inspect gears and splined parts for chipping or , excessive or uneven tooth wear, journal wear age, surface damage, thread damage, nicked rred keyways, and clogged oil holes. Repair of and splined parts is limited to blend repair of ed keyways and threads. (Refer to paragraph) Replace parts if damage is beyond repair.

Inspect accessory gearbox cover assembly gure 3-5, sheet 2) and accessory gearbox assembly (90) for damaged screw thread in- Replace damaged screw thread inserts as d in paragraph 7-137.

Inspect accessory gearbox housing assembly r damaged threads in chip detector port. Re- maged threads as outlined in paragraph 7-149.

g. Inspect painted surfaces for worn, chipped, or eroded paint. Repair painted surfaces as specified in paragraph 7-143.

h. Inspect all bearings as outlined in paragraph 7-28. Replace all defective bearings.

i. Inspect oil-air separator drive gearshaft assembly (63, figure 6-5) and oil pump drive gearshaft assembly (81) for damage and for cracked, loose, or missing rivets. Repair as outlined in paragraph 7-149.

j. Inspect baffle mounting tapped hole in accessory gearbox housing assembly (90) for damage. Repair as outlined in paragraph 7-149.

k. Inspect for scored bearing liners in accessory gearbox cover assembly (70) and accessory gearbox housing assembly (90). Scoring is not allowed. (See figure 7-4.)

l. Measure ID of bearing liners. If any measurement is 0.0002 inch greater than maximum dimensions shown in figure 7-4, the liner is unacceptable. Replace liner.

7-39. INSPECTION OF AIR DIFFUSER. Proceed as follows:

a. Inspect third row vanes for minor nicks, dents, and burrs. Minor nicks, dents, and burrs are acceptable for repair, provided mutilation has not occurred. Blend-repair as outlined in paragraph 7-136.

b. Inspect third row vanes for puncture. Minor punctures are acceptable, provided engine performance has not been affected.

bA. Inspect third row vane brazements for minor cracks, voids, and cracklike indications. Acceptable, provided requirements of steps a. and b. are met.

c. Blend-repair surface defects and remove sharp projections on vane where access permits. (Refer to paragraph 7-136.)

d. If cracks are suspected on the brazed joint of the air outlet pan assembly boss (P3 fitting), proceed as follows: (See figure 7-5.)

(1) Clean area to be inspected, using a stainless steel wire brush and drycleaning solvent (item 28, table 2-2).

(2) Inspect brazed area for cracks, using dye-penetrant inspection.

(3) Repair cracked braze joint of air outlet pan assembly boss (P3 fitting) by torch silver-braze repair as outlined in paragraph 7-136A. Use a fine tipped torch (No. 100).

(a) On T53-L-7/7A engines, use brazing flux (item 46, table 2-2) and brazing alloy (item 4A, table 2-2).

(b) On T53-L-15/701 engines, use flux (item 45A, table 2-2) and brazing alloy (item 4B, table 2-2).

NOTE

After torch braze repairing, ensure that the air passages are not clogged with braze material.

CAUTION

Do not attempt to repair base metal defects using the preceding method.

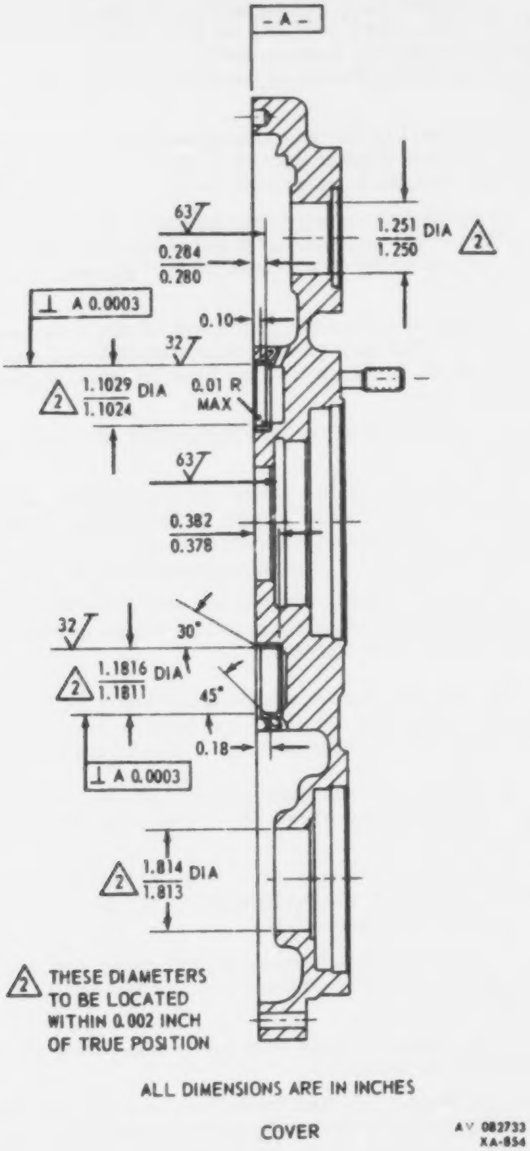

- A -
63
1.251 / 1.250 DIA
2
0.284 / 0.280
⊥ A 0.0003
0.10
32
1.1029 / 1.1024 DIA
0.01 R MAX
63
0.382 / 0.378
32
30°
1.1816 / 1.1811 DIA
45°
0.18
⊥ A 0.0003
1.814 / 1.813 DIA
2 THESE DIAMETERS TO BE LOCATED WITHIN 0.002 INCH OF TRUE POSITION
ALL DIMENSIONS ARE IN INCHES
COVER
AV 082733
XA-854

Figure 7-4. Accessory Drive Gearbox Assembly - Bearing Liner Inspection (Sheet 1 of 2)

7-40. INSPECTION OF COMBUSTOR TURBINE ASSEMBLY (T53-L-7/7A Engines). (See figure 3-15)

Proceed as follows:

NOTE

A thorough visual inspection shall be made, using a light and mirror. If the visual inspection reveals a need for repair or replacement, refer to the applicable paragraph for that particular component. Disassemble the combustor turbine assembly only as far as necessary to correct the condition.

a. Inspect combustor turbine assembly for v ible damage. If damage is noted, refer to applic paragraphs for limits and replacement of damaged components.

b. Inspect for elongated bolt holes.

c. From rear end, insert feeler gage (1/4 inch wide) between power turbine rotor blades and pow turbine cylinder. Measure tip clearance. Minimum tip clearance is 0.025 inch. If minimum clearance not observed, check for power turbine blade grow (Refer to paragraph 3-46.)

d. Inspect condition of asbestos seal. Replace burned or distorted.

e. Inspect for indication of No. 3 seal failure. 3 seal failure is indicated by:

(1) Oil and carbon deposits on rear face of power turbine wheel.

(2) Excessive exhaust smoke during engine operation.

(3) A thick deposit of soft wet carbon on co ing air deflector near the bolt holes.

7-41. INSPECTION OF POWER SHAFT BOLT (T L-7/7A Engines).

(See figure 3-15.) Inspect power shaft bolt (4, figure 3-15) for nicks, burrs, crac damaged threads, and mutilation. Repair minor thread damage (paragraph 7-137) and nicks and burrs (paragraph 7-136). Replace bolt if cracks or mutilition are noted.

NOTE

If cracks are suspected, perform magnetic particle inspection. (Refer to paragraph 7-30.)

7-42. INSPECTION OF FIRE SHIELD, AFT DIFFUSER SUPPORT CONE, POWER TURBINE TU AND OIL NOZZLE (T53-L-7/7A Engines).

(See ure 6-9.) Proceed as follows:

a. Inspect parts for nicks and burrs. Blend- nicks and burrs are outlined in paragraph 7-134

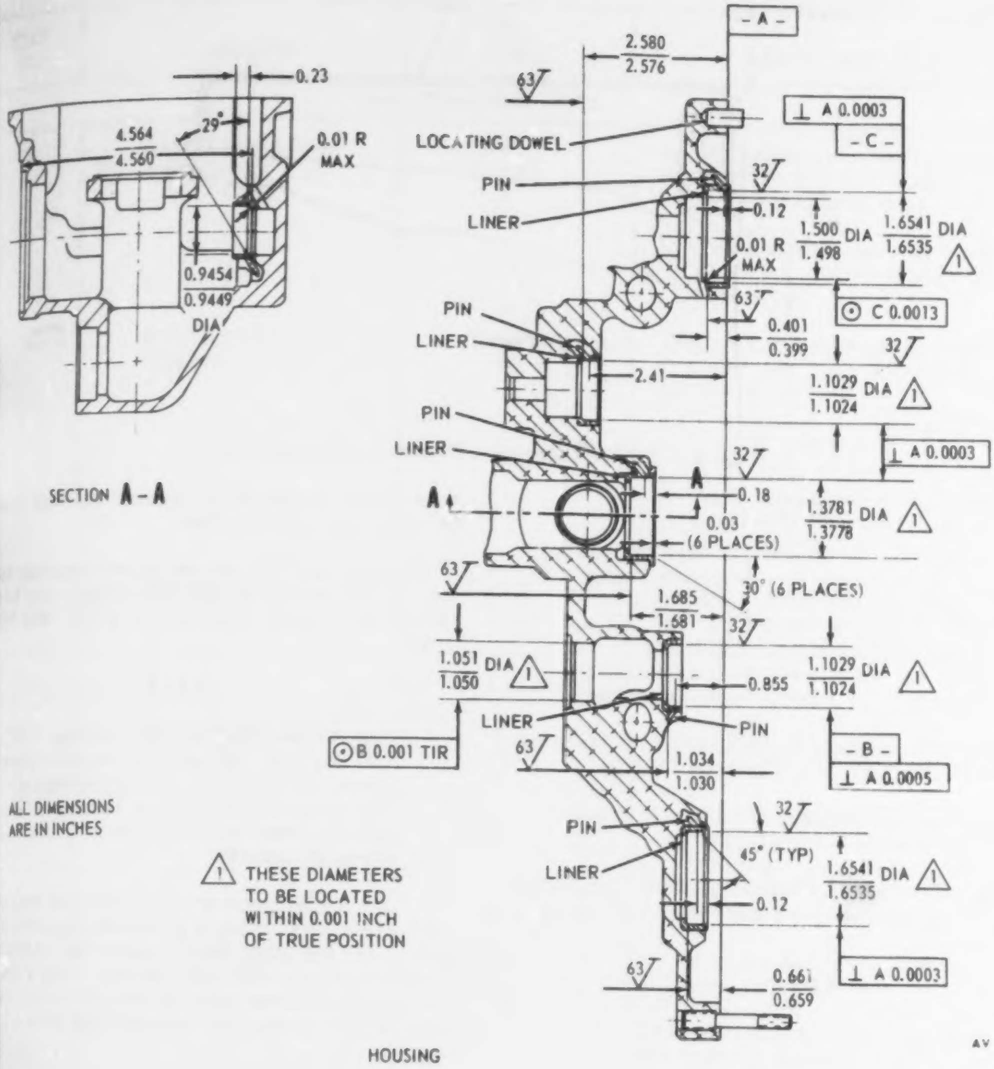

- A -
2.580
2.576
63
0.23
4.564
4.560
29°
0.01 R
MAX
0.9454
0.9449
DIA
SECTION A - A
LOCATING DOWEL
PIN
LINER
⊥ A 0.0003
- C -
32
0.12
1.500
1.498
DIA
1.6541
1.6535
DIA
0.01 R
MAX
⊙ C 0.0013
0.401
0.399
2.41
1.1029
1.1024
DIA
⊥ A 0.0003
A
0.18
0.03
(6 PLACES)
1.3781
1.3778
DIA
30° (6 PLACES)
1.685
1.681
1.051
1.050
DIA
0.855
1.1029
1.1024
DIA
⊙B 0.001 TIR
1.034
1.030
- B -
⊥ A 0.0005
ALL DIMENSIONS
ARE IN INCHES
45° (TYP)
1.6541
1.6535
DIA
0.12
THESE DIAMETERS
TO BE LOCATED
WITHIN 0.001 INCH
OF TRUE POSITION
0.661
0.659
⊥ A 0.0003
HOUSING
AV 082734
X-854

Figure 7-4. Accessory Drive Gearbox Assembly - Bearing Liner Inspection (Sheet 2 of 2)

Visually inspect fire shield and igniter mounts e shield for cracks. (Refer to table 7-3). Using procedure in paragraph 7-139, repair cracks e shield. Replace fire shield if any igniter boss converging cracks meet (360 degrees) or if a f metal breaks loose.

NOTE

Converging cracks in the igniter boss cover n the fire shield are acceptable provided hey do not meet. Nonconverging cracks re acceptable in excess of 360 degrees, provided a ring of metal cannot be broken ree or removed from any of the igniter oss covers.

c. Visually inspect support cone for cracks. Using welding procedure in paragraph 7-139, repair cracks.

d. Visually inspect threaded parts for damaged threads. Replace power turbine tubes and igniter mounts, if cracked or crossed threads are found.

e. Visually inspect parts for distortion. Replace parts if defective.

7-43. INSPECTION OF SECOND STAGE TURBINE NOZZLE ASSEMBLY (T53-L-7/7A Engines). (See figure 6-12.) Proceed as follows:

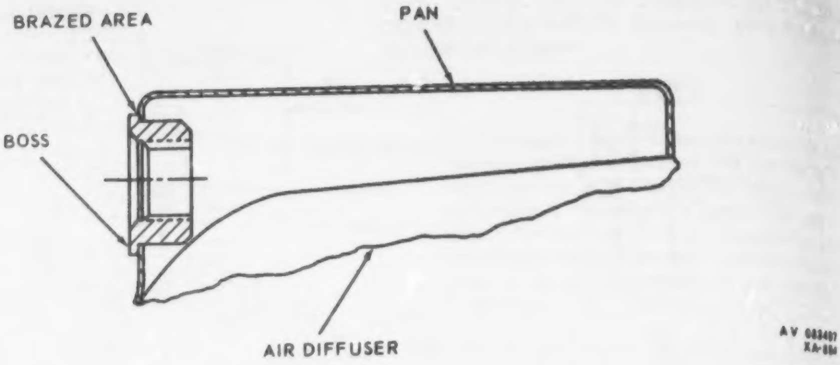


Figure 7-5. Air Diffuser - Brazed Area Inspection

NOTE

All inspections of the second stage turbine nozzle assembly shall be performed using both visual and dye-penetrant inspection methods. (Refer to paragraph 7-29.) If a dye-penetrant inspection cannot be performed, visually inspect the nozzle assembly using a 5- or 7-power magnifying glass.

a. Inspect second stage turbine nozzle as described in table 7-4. (See figures 7-6 through 7-12.)

b. Replace second stage turbine nozzle if any of the conditions in table 7-4 are exceeded.

7-44. INSPECTION OF POWER TURBINE CYLINDER (T53-L-7/7A Engines). (See figure 6-12.) Proceed as follows.

NOTE

In following step a., measure cylinder at forward middle, and aft areas at each of the four points.

a. If minimum tip clearance was not obtained during power turbine blade tip clearance measurement (paragraph 3-46), measure cylinder ID at four points.

b. If warpage is noted, rework cylinder as outlined in paragraph 7-152.

7-45. INSPECTION OF COMBUSTION CHAMBER HOUSING (T53-L-7/7A Engines). (See figures 6-8 and 6-10.) Proceed as follows:

a. Visually inspect threaded parts for crossed threads. Replace parts if threads are crossed.

b. Inspect V-band coupling for wear, dents, and cracks. Replace coupling if damaged.

c. With aid of magnifying glass of at least 5-power and a good light, determine location and length of all boss area cracks in combustion chamber ho by close visual inspection.

d. Housings with cracks at fuel vaporizer b that do not exceed the following limits, may be r paired as outlined in paragraph 7-153. (See fig 7-13.)

NOTE

For combustion chamber housings 1-130-020-01, -02, -03, and -05, observe crack limits in following steps (1) through (4). For combustion chamber housing 1-130-020-08, observe crack limits in following steps (5) and (6).

(1) A maximum of two cracks per boss is acceptable, one having a maximum length of tw inches and the other three inches with maximu allowable crack width of 1/32 inch. (See detail No more than three adjacent bosses or a maxi total of eight bosses per housing may ha crack.

(2) A maximum of three 2 inch cracks pe boss are acceptable, with the nearest ends sep by enough solid metal to leave at least 3/4 inc drilling. Maximum allowable crack width is 1/ inch. (See detail B.)

NOTE

If a crack runs horizontally above the boss, and another below the boss, a third converging crack is acceptable provid that it does not run vertically or perpe dicular to the horizontal cracks.

(3) A crack that passes through the wa and terminates in parent metal at both ends is able, provided that it does not pass through the fillet over more than one inch. (See detail C.)

Table 7-4. Second Stage Turbine Nozzle Assembly - Inspection Limits

STEP NO.	DEFECT	FIG. REF	INSPECTION LIMIT
		VANE TRAILING EDGE	
1.	Axial Cracks (Non-converging)	7-7 Detail A	a. Any number of cracks, each less than 1/4 inch long, are acceptable on each vane b. Three cracks, each up to one inch long, are acceptable on each vane
2.	Axial Cracks (Converging)	Detail B	Converging cracks are acceptable provided minimum distance between cracks is 1/4 inch **CAUTION** Converging cracks that create possibility of material fallout are not permitted.
3.	Burned Areas	Detail C	Burned areas up to 5/8 inch radial length by 3/8 inch axial length are acceptable on four vanes
		VANE LEADING EDGE	
4.	Axial Cracks (Non-converging)	7-8 Detail A	Two cracks, each up to 3/8 inch long, are acceptable on each vane **CAUTION** Converging cracks that create possibility of material fallout are not permitted.
5.	Axial Cracks (Converging)	Detail B	a. A crack extending from leading edge is not permitted if it is closer than 3/4 inch to a crack extending from trailing edge **CAUTION** Converging cracks that create possibility of material fallout are not permitted.
		Detail C	b. Converging cracks are acceptable provided minimum distance between cracks is 1/4 inch
6.	Burned Areas	Detail D	Burned areas up to one inch radial length by 1/8 inch axial length are acceptable on 12 vanes
		VANES	
7.	Bowing		Bowing is acceptable; no inspection is required
8.	Nicks, dents, and Burrs		Defects are acceptable provided sharp edges or protrusions are blend-repaired

Table 7-4. Second Stage Turbine Nozzle Assembly - Inspection Limits (Cont)

STEP NO.	DEFECT	FIG. REF	INSPECTION LIMIT
	INNER AND OUTER SHROUDS		
9.	Inner Shroud OD Cracks	7-9	a. One circumferential crack up to 3 inches long is allowed CAUTION A combination of circumferential and radial cracks is not permitted. b. Three one inch radial cracks extending from vane leading edge are allowed provided cracks are separated by at least three unaffected vanes
10.	Inner Shroud ID Cracks	7-10	Each vane-to-inner-shroud joint may be cracked up to 1/2 joint length
11.	Outer Shroud OD Cracks	7-11	Each vane-to-outer shroud joint may be cracked up to 1/2 joint length
12.	Outer Shroud ID Cracks	7-12	Five axial cracks extending from vane trailing edge to mounting flange are acceptable provided cracks are no closer than 3 inches apart and do not penetrate flange
	SEAL		
13.	Cracks		a. Cracks in seal are not permitted b. Cracks in rivet heads are acceptable provided rivet remains intact. Replace rivet if otherwise damaged or missing

(4) A crack that does not exceed 1-1/2 inches along the edge of the weld fillet is acceptable. (See detail D.)

(5) A maximum of one crack per boss is permissible, each crack being no more than 1-1/2 inch long with maximum allowable crack width of 1/32 inch. No more than three nonadjacent bosses may be affected. (See detail D.)

(6) A crack that passes through the brazement and terminates in parent metal at both ends is acceptable provided it does not pass through the brazement for more than one inch. (See detail C.)

e. With aid of magnifying glass of at least 5-power, inspect liner support plates or combustion chamber housing 1-130-020-08 for cracks as follows, and replace as outlined in paragraph 7-154.

(1) Each plate may be cracked on one the support and is acceptable without repair.

(2) Plates having more than one side of cracked must be replaced.

7-46. INSPECTION OF COMBUSTION CHAM LINER (T53-L-7/7A Engines). (See figure 6- Proceed as follows. Unless a preliminary ins tion of the combustion chamber liner indicate extensive damage or carbon buildup, it is not sary to remove the vaporizers to inspect the nor is it necessary to remove liner from com tion chamber housing. If liner must be remov it should be cleaned before inspection. (Refer table 7-1.)

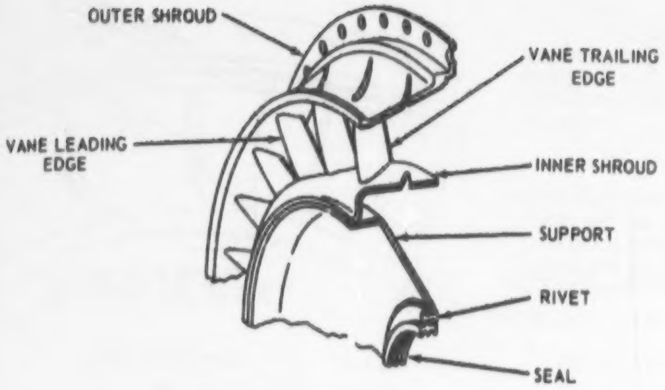

OUTER SHROUD
VANE TRAILING EDGE
VANE LEADING EDGE
INNER SHROUD
SUPPORT
RIVET
SEAL
AV 082735
XA-854

Figure 7-6. Second Stage Turbine Nozzle Assembly (T53-L-7/7A)

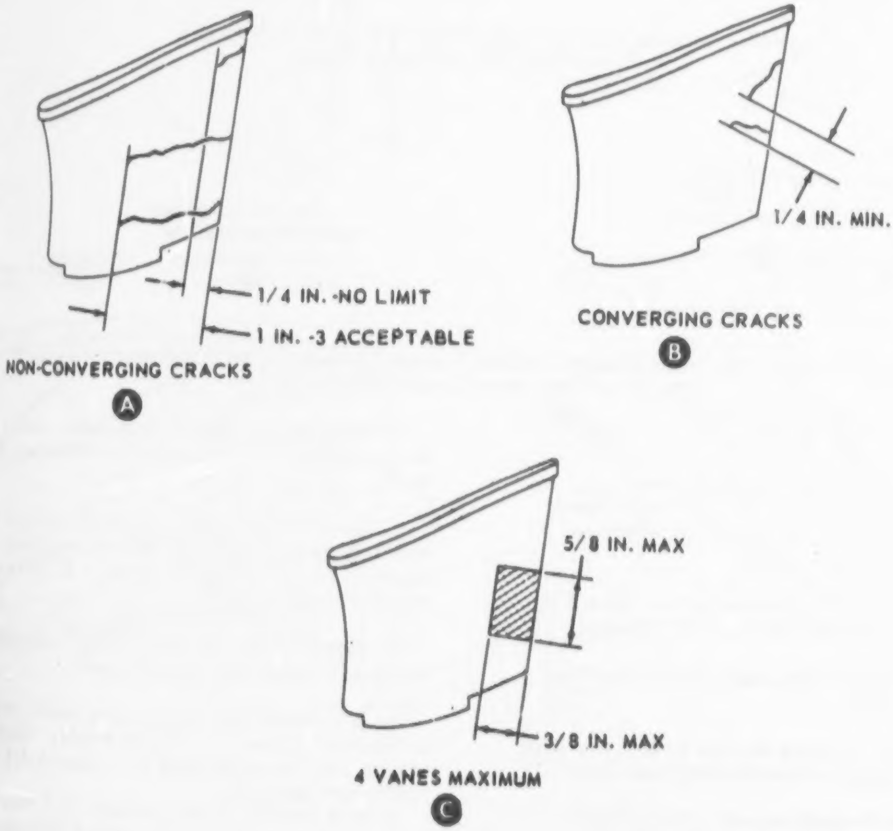

1/4 IN. -NO LIMIT
1 IN. -3 ACCEPTABLE
NON-CONVERGING CRACKS
A
1/4 IN. MIN.
CONVERGING CRACKS
B
5/8 IN. MAX
3/8 IN. MAX
4 VANES MAXIMUM
C
AV 082736
XA-854

Figure 7-7. Second Stage Turbine Nozzle Assembly - Vane Trailing Edge Crack and Burn Limits (T53-L-7/7A)

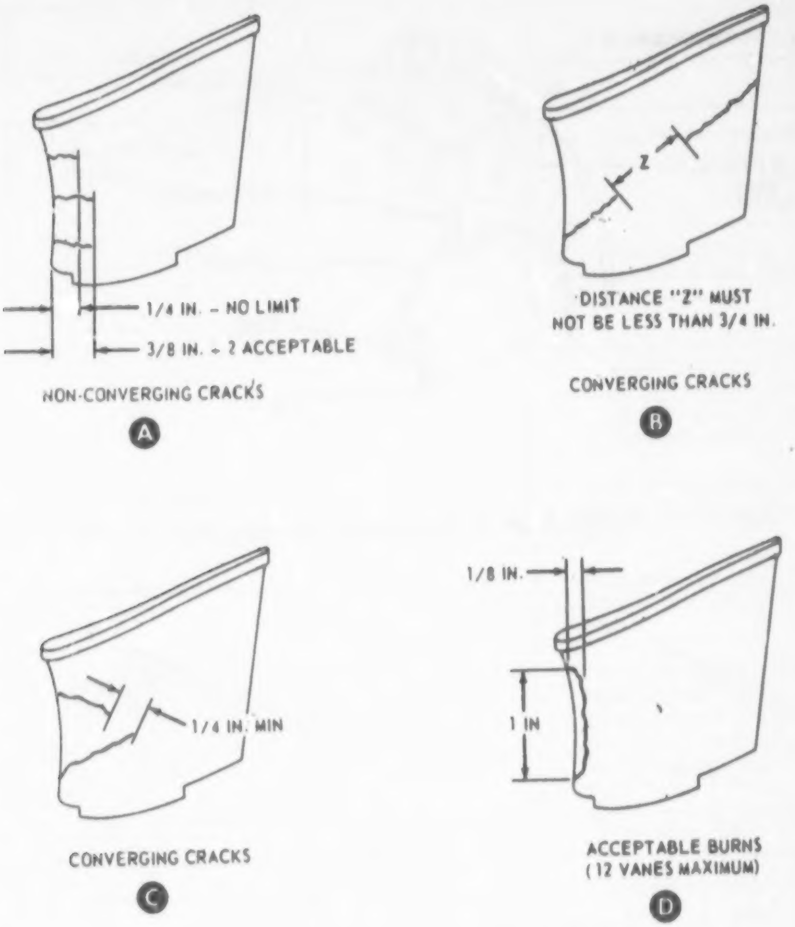

1/4 IN. - NO LIMIT
3/8 IN. - 2 ACCEPTABLE
NON-CONVERGING CRACKS
A
Z
DISTANCE "Z" MUST NOT BE LESS THAN 3/4 IN.
CONVERGING CRACKS
B
1/4 IN. MIN
CONVERGING CRACKS
C
1/8 IN.
1 IN
ACCEPTABLE BURNS (12 VANES MAXIMUM)
D

Figure 7-8. Second Stage Turbine Nozzle Assembly - Vane Leading Edge Crack and Burn Limits (T53-L-7/7A)

NOTE

If crack indications are questionable or crack ends are difficult to determine, the inspection method described in following step a. is recommended.

a. Clean area with trichloroethylene (item 113, table 2-2). Wipe dry and proceed as follows:

(1) With clean brush, apply Turco Dy/Chek (item 117, table 2-2).

(2) Allow 10 minutes for dye to dry, and wipe off with cloth soaked in trichloroethylene (item 113, table 2-2).

(3) Spray area with Turco Dy/Mark Developer (item 118, table 2-2) until dull white film appears. Cracks will appear as red line.

b. If carbon buildup is excessive, clea
lined in table 7-1. If limits are exceeded, r
liner.

c. Inspect combustion chamber liner for
burns, deposits, warpage, and other defects
figure 7-14 for reference areas.) If limits
ceeded, replace liner.

d. Crack limits for all areas are as foll
limits are exceeded, replace liner.

(1) Converging cracks that create p
of material fallout are not acceptable. Co
cracks shall be separated by at least 1-1/4
unaffected material.

(2) Any number of cracks up to 1/8
length are acceptable.

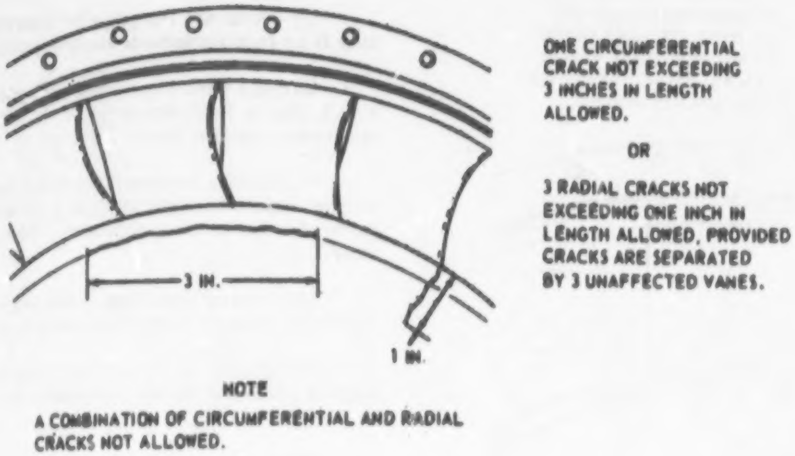

ONE CIRCUMFERENTIAL CRACK NOT EXCEEDING 3 INCHES IN LENGTH ALLOWED.
OR
3 RADIAL CRACKS NOT EXCEEDING ONE INCH IN LENGTH ALLOWED, PROVIDED CRACKS ARE SEPARATED BY 3 UNAFFECTED VANES.
3 IN.
1 IN.
NOTE
A COMBINATION OF CIRCUMFERENTIAL AND RADIAL CRACKS NOT ALLOWED.
AV 062738
XA-654

Figure 7-9. Second Stage Turbine Nozzle Assembly - Inner Shroud Crack Limits (T53-L-7/7A)

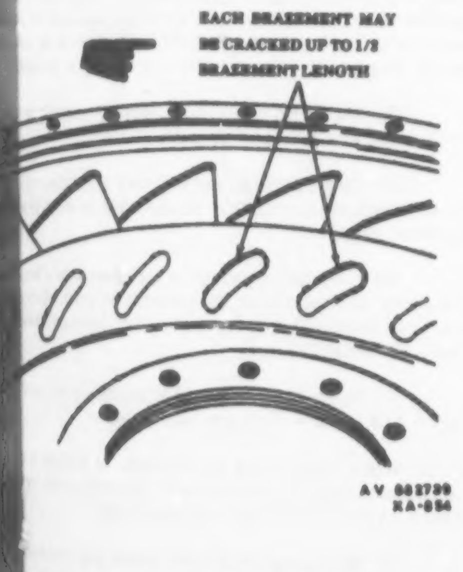

EACH BRAZEMENT MAY BE CRACKED UP TO 1/2 BRAZEMENT LENGTH
AV 062739
XA-654

Figure 7-10. Second Stage Turbine Nozzle Assembly - Junction of Vanes and Inner Shroud Crack Limits (T53-L-7/7A)

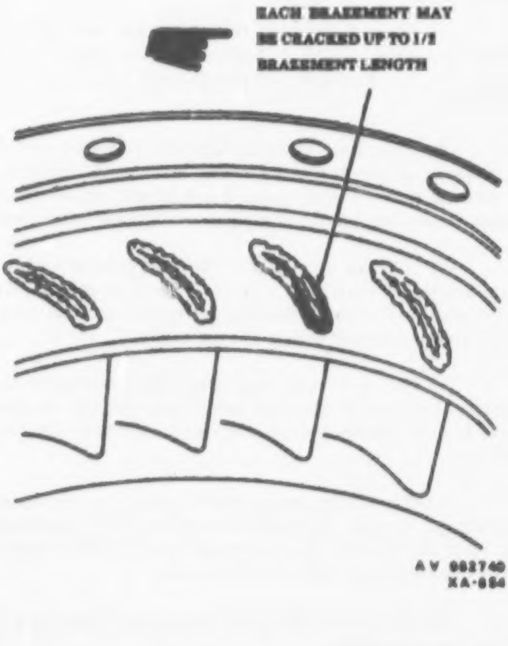

EACH BRAZEMENT MAY BE CRACKED UP TO 1/2 BRAZEMENT LENGTH
AV 062740
XA-654

Figure 7-11. Second Stage Turbine Nozzle Assembly - Junction of Vanes and Outer Shroud Crack Limits (T53-L-7/7A)

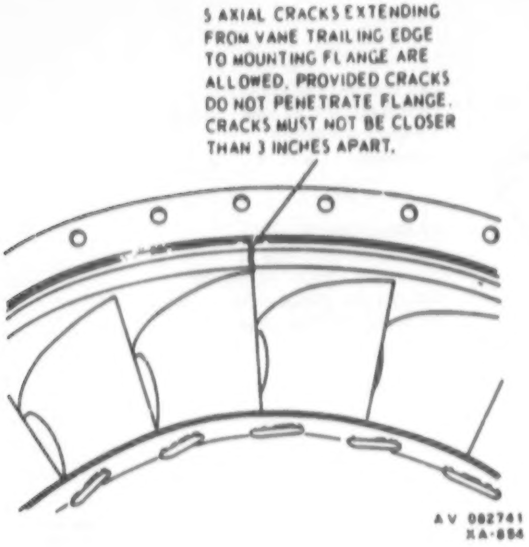

5 AXIAL CRACKS EXTENDING FROM VANE TRAILING EDGE TO MOUNTING FLANGE ARE ALLOWED, PROVIDED CRACKS DO NOT PENETRATE FLANGE. CRACKS MUST NOT BE CLOSER THAN 3 INCHES APART.
AV 082741
XA-884

Figure 7-12. Second Stage Turbine Nozzle Assembly - Outer Shroud Crack Limits (T53-L-7/7A)

e. Damage limits for inner liners (4 and 5) and outer liners (10 and 11) are as follows. Repair liners as outlined in paragraph 7-154, or replace liner if limits are exceeded.

(1) Cracks between two holes are acceptable without repair except in areas shown in figure 7-15, sheet 1. Ten nonadjacent cracks per assembly are allowed.

(2) Divergent cracks between 1/2 inch and 2 inches in length are acceptable after stop drilling, provided that accumulated crack length does not exceed 10 inches on inner and outer liners combined.

(3) Cracks in a total of 30 resistance welds are acceptable without repair in each liner-to-liner or liner-to-flange weldment, provided that no more than four adjacent welds are affected.

(4) One 3/8 inch long crack emanating from sawcut into inner forward tab is acceptable without repair. No more than two nonadjacent tabs may be affected.

(5) Cracks in parent metal between resistance weldment dimple cuts are acceptable in 30 percent of each dimple series, provided that no more than five consecutive cuts are affected.

(6) Burn through shall not exceed one square inch per assembly.

(7) Five weldment dimples per series may be burned through without repair.

(8) Only one missing tab on forward
liner is acceptable.

(9) Moderate warpage or buckling is
able if no interference of mating parts occurs

f. Damage limits for plate and end liner
bly (9, figure 7-14) are as follows. If limits
exceeded, replace liner.

(1) Cracks between two holes are
without repair in eight places, provided that
pairs of holes are not adjacent. (See figure
sheet 1.)

(2) Cracks extending from edge of plate
vaporizer hole or disc weldments are

(3) Cracks up to 1/2 inch long
edge of plate and do not terminate at a hole
ceptable.

(4) Converging cracks in all areas
separated by at least 1/2 inch of unaffected

(5) Burn throughs are acceptable on
to 1/2 square inch per assembly.

g. Damage limits for end liner are as
limits are exceeded, replace liner.

(1) Cracks between two holes are
in eight locations without repair, provided
of holes are not adjacent to one another.
7-15.)

(2) Cracks between 1/2 inch and 2
length are acceptable after stop drilling,
accumulative crack length does not exceed
and distance between two adjacent cracks is
to or longer than the length of the longer

(3) Two cracks in each igniter plate
weldment are acceptable without repair.

(4) One crack in each of two
stud brackets or bracket weldments is
without repair.

(5) Cracks in parent metal between
cuts are acceptable in 20 percent of each
series, provided that no more than five
cuts are affected.

(6) Burn throughs are acceptable
up to 1/2 square inch per assembly.

h. Wear limits are as follows. If
exceeded, replace stud mount brackets and
seals as outlined in paragraph 7-154.

(1) Mounting stud wear shall not
inch.

(2) Stud bracket wear shall not
cent of original thickness.

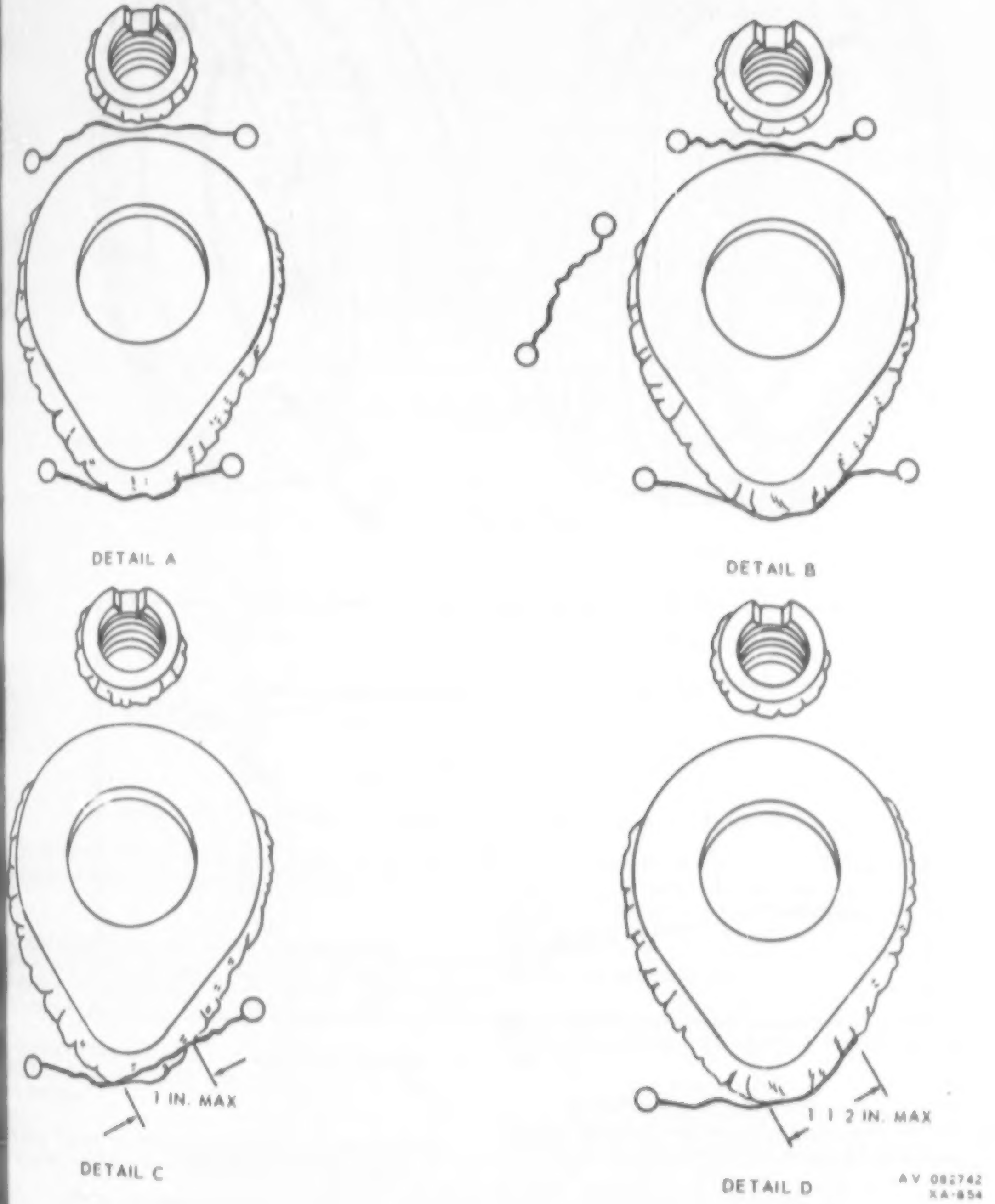
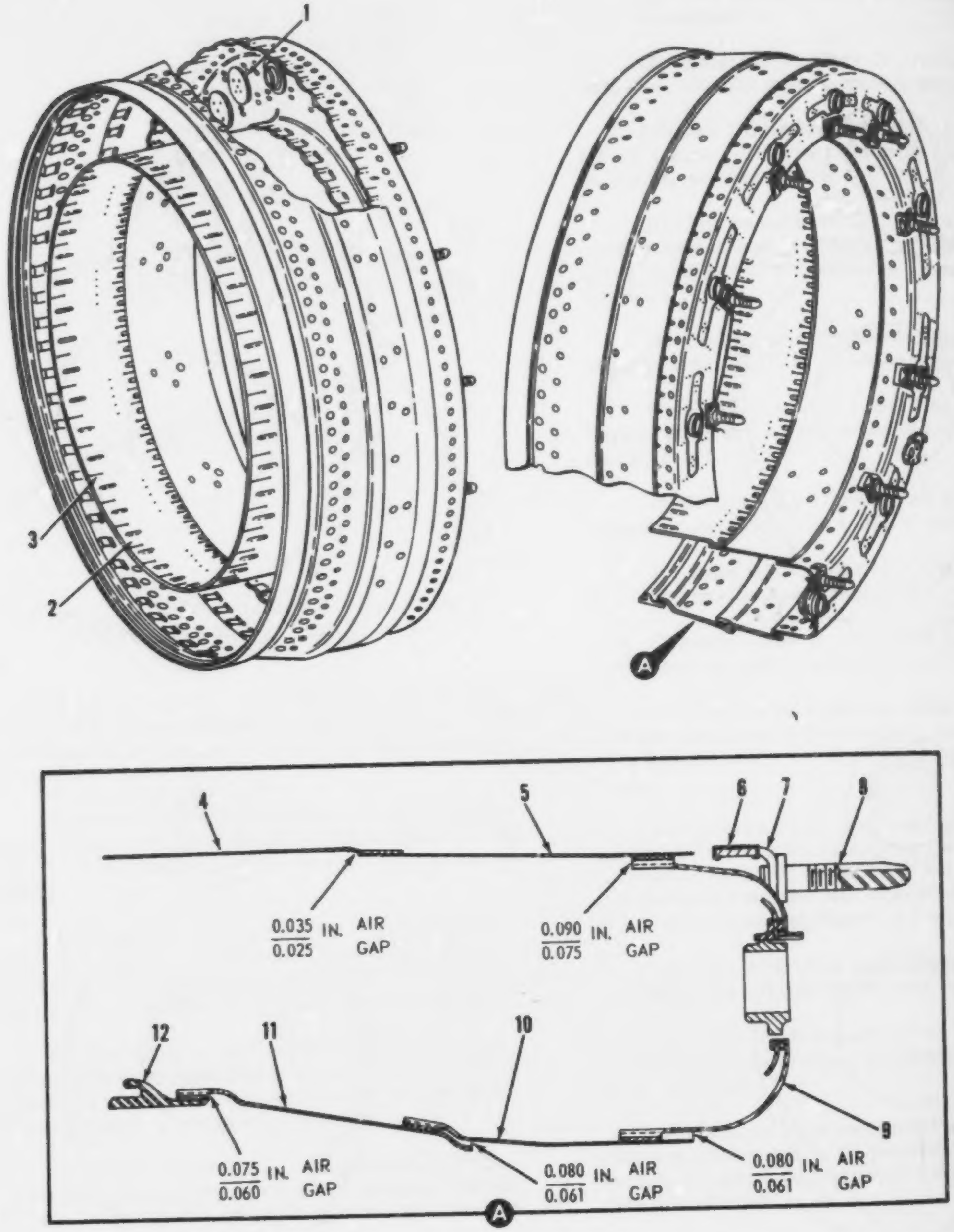

DETAIL A
DETAIL B
1 IN. MAX
DETAIL C
1 1 2 IN. MAX
DETAIL D
AV 062742
XA-854

Figure 7-13. Combustion Chamber Housing Cracks (T53-L-7/7A) (Typical)


1
3
2
A
4
5
6
7
8
0.035 / 0.025 IN. AIR GAP
0.090 / 0.075 IN. AIR GAP
12
11
10
9
0.075 / 0.060 IN. AIR GAP
0.080 / 0.061 IN. AIR GAP
0.080 / 0.061 IN. AIR GAP
A

1. Disc
2. Tab
3. Sawcut
4. Forward Inner Liner
5. Rear Inner Liner
6. Retainer Plate
7. Mounting Bracket
8. Stud
9. Plate and End Liner Assembly
10. Rear Outer Liner
11. Forward Outer Liner
12. Flange

Figure 7-14. Combustion Chamber Liner (T53-L-7/7A)

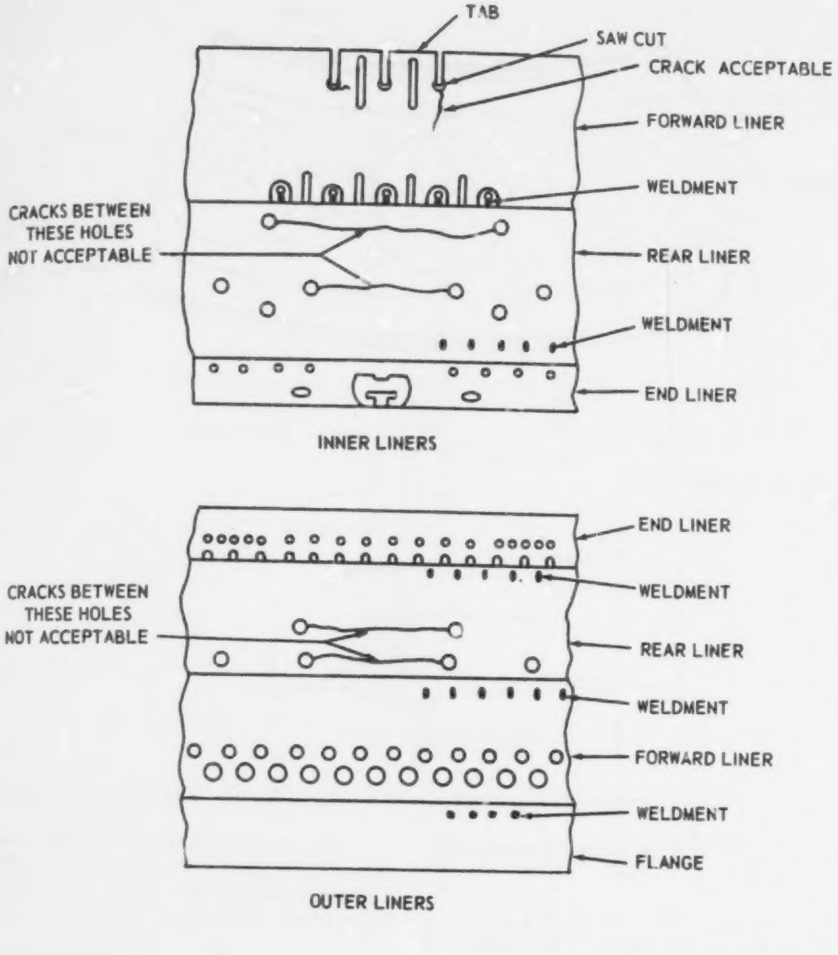

TAB
SAW CUT
CRACK ACCEPTABLE
FORWARD LINER
WELDMENT
CRACKS BETWEEN THESE HOLES NOT ACCEPTABLE
REAR LINER
WELDMENT
END LINER
INNER LINERS
END LINER
WELDMENT
CRACKS BETWEEN THESE HOLES NOT ACCEPTABLE
REAR LINER
WELDMENT
FORWARD LINER
WELDMENT
FLANGE
OUTER LINERS
AV 082744
X-854

Figure 7-15. Combustion Chamber Liner Cracks (T53-L-7/7A) (Sheet 1 of 2)

(3) Wear on tabs of vaporizer seals and igniter
es shall not exceed 50 percent of original thick-
s.

. Slight distortion or buckling is permitted.
tortion of air gaps that exceed limits shown in
re 7-14 is not permitted. Distorted air gaps
ll be adjusted, using a suitable prying tool.

7. INSPECTION OF FUEL VAPORIZER ASSEM-
(T53-L-7/7A Engines). (See figure 6-[illegible]). Pro-
as follows:

. Using lights, mirrors, and 7-power magnifying
, inspect as follows: (See figures 7-16 and
.)

NOTE

Fuel vaporizer inspection gage shown in
figure 7-17 may be fabricated locally, us-
ing aluminum stock. (Refer to Appen-
dix C.)

(1) Inspect fuel vaporizer assembly for burning. Burns on exit legs less than 1-1/2 inch in length and 1/8 inch in width, or burns less than 1/2 inch in length and 1/4 inch in width are permissible. (See figure 7-16.) Complete leg burnoff beyond 1/8 inch is not permissible.

(2) Holes with 1/8 inch maximum diameter are allowed in all exit legs within 1/2 inch from end of exit leg.

(3) Not more than 1/8 inch warpage or tilt (in any direction) of entire vaporizer or of exit legs is allowed in all vaporizers and in all exit legs.

NOTE

Inlet tube and exit legs must be parallel and symmetrical. Warpage may be judged by deviation from parallel or from symmetry. To check, place used vaporizer assembly against an outline drawn from a new assembly.

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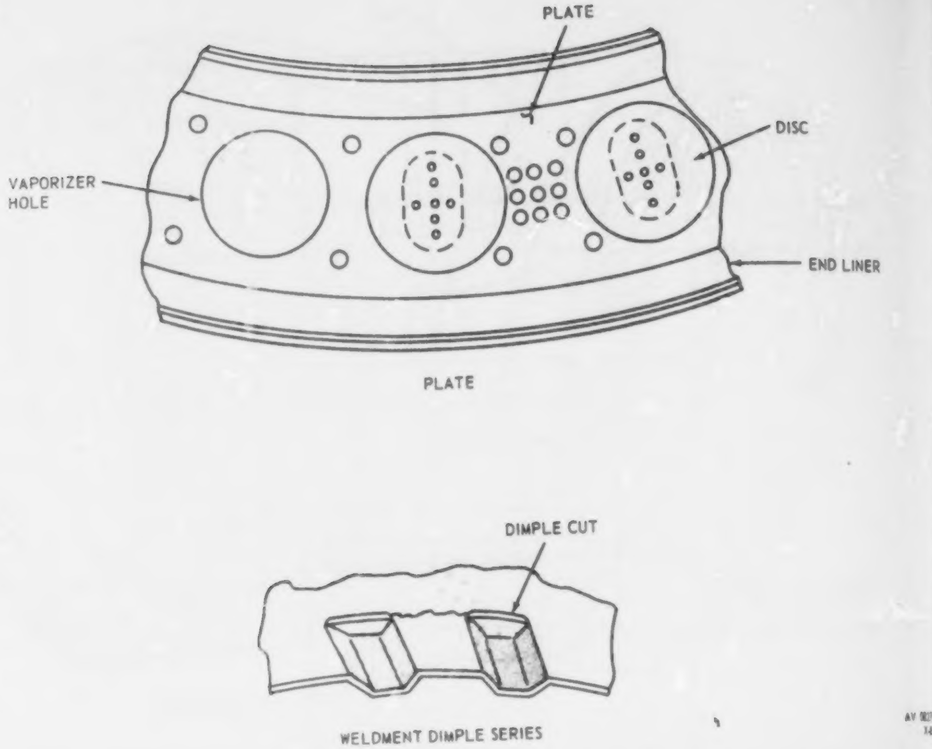

Figure 7-15. Combustion Chamber Liner Cracks (T53-L-7/7A) (Sheet 2 of 2)

(4) Cracks up to 1-1/2 inch long are allowed in end of exit leg.

(5) Burn bulges are acceptable up to 1/32 inch provided that no cracks appear on bulge. Fuel vaporizer shall be rejected if burn bulge cracks are questionable.

(6) Fuel vaporizer exit leg out-of-roundness up to 1/8 inch is allowable.

(7) Inspect divider for clogging and clean as indicated in table 7-1.

(8) Inspect splitter for distortion. If divider can be inserted into splitter properly, distortion is acceptable. If divider cannot be inserted into splitter, it is unacceptable and fuel vaporizer must be replaced.

(9) Inspect four weldments joining shroud to adapter. If no crack indications are noted, vaporizers may be reinstalled, provided that no other damage is suspected.

(10) If visual inspection of shroud weldments discloses any crack-like indications, additional inspection of weldments should be accomplished, using dye-penetrant inspection. (Refer to paragraph 7-29). If cracks are noted in shroud weld area, replace vaporizer.

(11) Inspect the fuel vaporizer bushing for age in the area where it contacts the fuel manif Burring or distortion which would affect mating faces is not permitted.

b. If limits given in preceding step a. are ex ceeded, replace fuel vaporizer as follows:

NOTE

If inspection of divider reveals no malfunction, change only the vaporizer.

(1) Insert 8-32 socket-head screw into d Remove divider and sleeve.

(2) Install divider and new bushing into vaporizer and reinspect.

(3) Perform functional test of fuel vapori assembly. (Refer to paragraph 8-67.)

7-48. INSPECTION OF EXHAUST DIFFUSER L-7/7A Engines). (See figure 6-13 and 7-18) ceed as follows:

a. Inspect outer struts for dents that can d outer strut and produce a gap greater than 1/1 between outer strut and outer strut fairing. ure 7-18.) Using 10-power magnifying glass penetrant method (refer to paragraph 7-29), such dents for possible cracks.

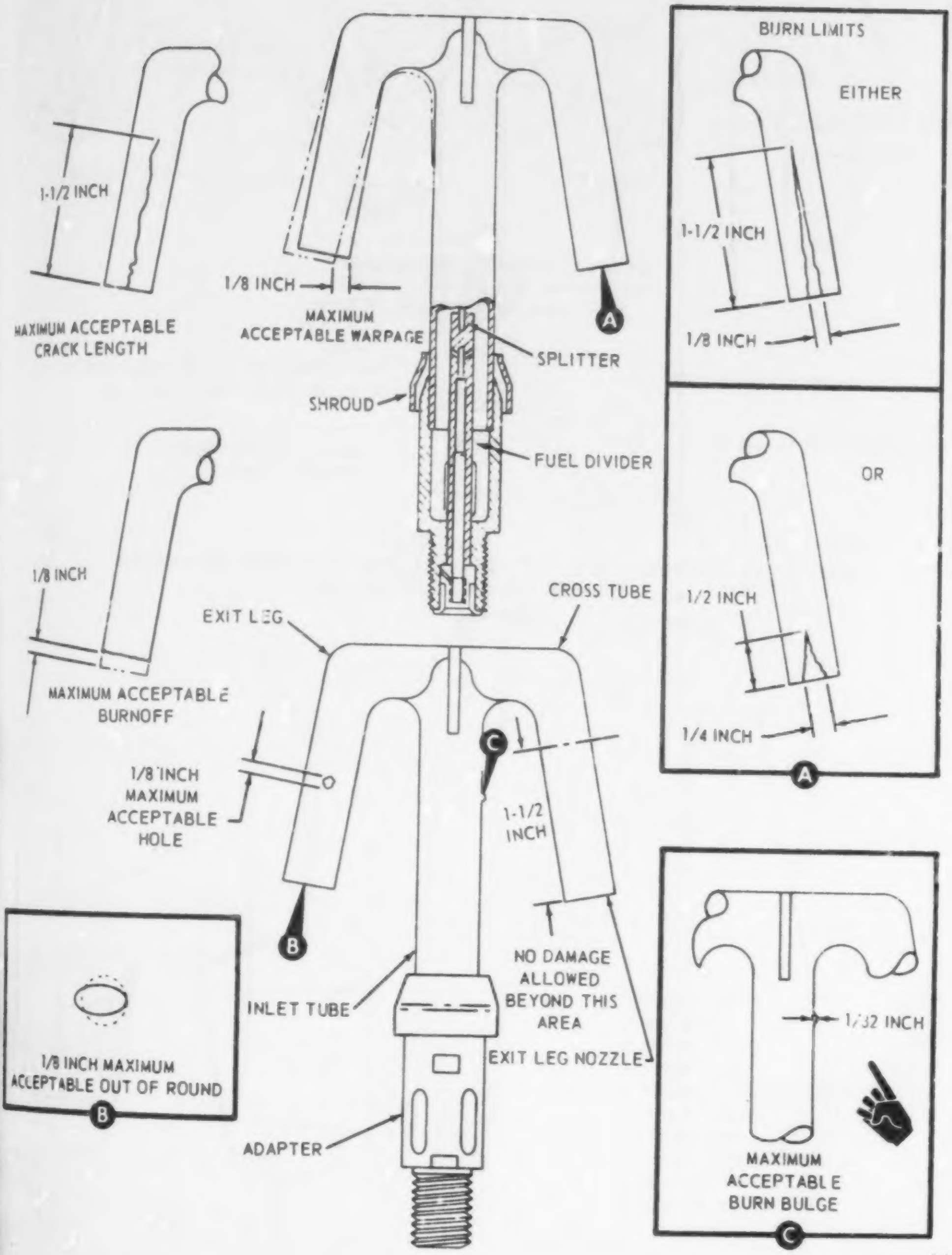
1-1/2 INCH
MAXIMUM ACCEPTABLE CRACK LENGTH
1/8 INCH
MAXIMUM ACCEPTABLE WARPAGE
A
SPLITTER
SHROUD
FUEL DIVIDER
BURN LIMITS
EITHER
1-1/2 INCH
1/8 INCH
OR
1/2 INCH
1/4 INCH
A
1/8 INCH
MAXIMUM ACCEPTABLE BURNOFF
EXIT LEG
CROSS TUBE
C
1/8 INCH MAXIMUM ACCEPTABLE HOLE
1-1/2 INCH
B
NO DAMAGE ALLOWED BEYOND THIS AREA
INLET TUBE
EXIT LEG NOZZLE
1/8 INCH MAXIMUM ACCEPTABLE OUT OF ROUND
B
ADAPTER
1/32 INCH
MAXIMUM ACCEPTABLE BURN BULGE
C

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Figure 7-16. Fuel Vaporizer Damage Limits (T53-L-7/7A)

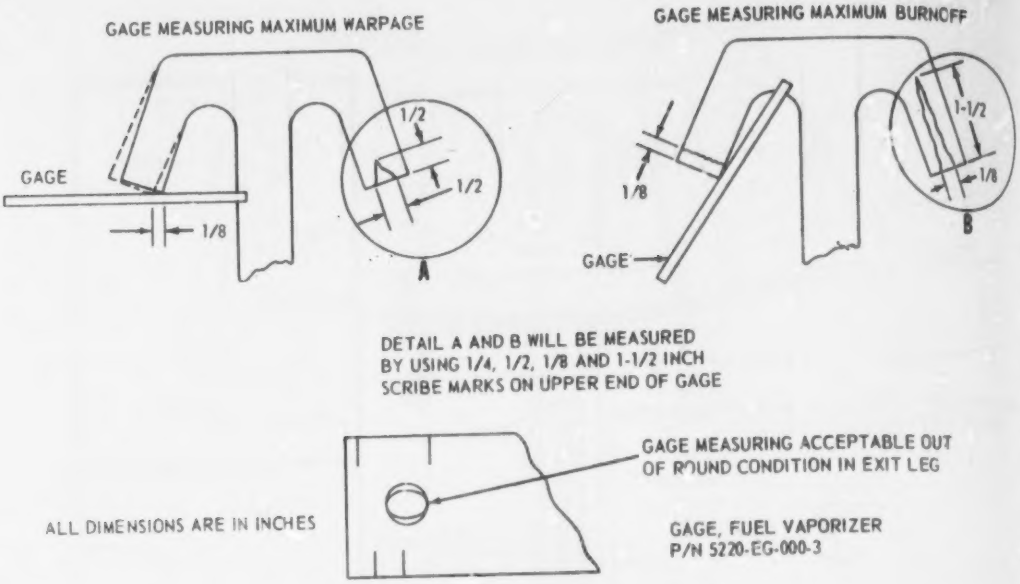
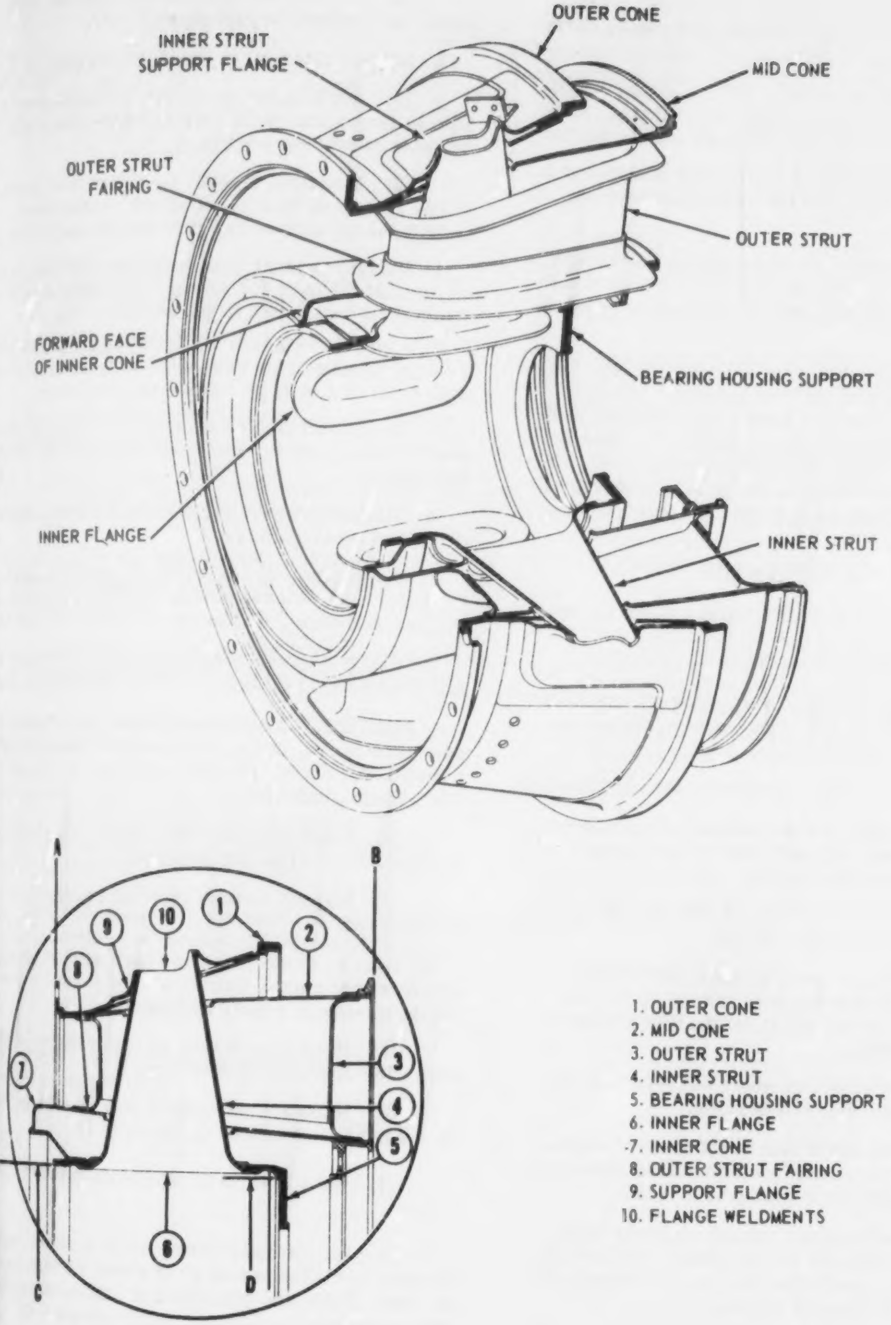

GAGE MEASURING MAXIMUM WARPAGE
GAGE
1/8
1/2
1/2
A
GAGE MEASURING MAXIMUM BURNOFF
1/8
GAGE
1-1/2
1/8
B
DETAIL A AND B WILL BE MEASURED BY USING 1/4, 1/2, 1/8 AND 1-1/2 INCH SCRIBE MARKS ON UPPER END OF GAGE
ALL DIMENSIONS ARE IN INCHES
GAGE MEASURING ACCEPTABLE OUT OF ROUND CONDITION IN EXIT LEG
GAGE, FUEL VAPORIZER
P/N 5220-EG-000-3

Figure 7-17. Inspection Gage (T53-L-7/7A) (Fuel Vaporizer Assemblies 1-130-590-01 and 1-130-590-02)


OUTER CONE
INNER STRUT SUPPORT FLANGE
MID CONE
OUTER STRUT FAIRING
OUTER STRUT
FORWARD FACE OF INNER CONE
BEARING HOUSING SUPPORT
INNER FLANGE
INNER STRUT
A
B
C
D
1
2
3
4
5
6
7
8
9
10

1. OUTER CONE
2. MID CONE
3. OUTER STRUT
4. INNER STRUT
5. BEARING HOUSING SUPPORT
6. INNER FLANGE
7. INNER CONE
8. OUTER STRUT FAIRING
9. SUPPORT FLANGE
10. FLANGE WELDMENTS

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Figure 7-18. Exhaust Diffuser Inspection Areas (T53-L-7/7A)

b. Using approved marking pencil, mark all cracks within maximum permissible limits and tag exhaust diffuser for stop drilling. If limits are exceeded, weld repair as outlined in paragraph 7-139.

c. Visually inspect all areas for cracks, nicks, dents, burning, distortion, deteriorated paint, corrosion, and foreign object damage.

(1) Nicks are acceptable without repair in all areas except inner strut and inner strut flange, provided there is no interference between mating parts.

(2) Minor dents and distortions are acceptable without repair, provided no interference of mating parts occur.

(3) Major damage or associated distortion is cause for rejection of exhaust diffuser. Forward diffuser to next higher maintenance category for evaluation.

(4) Surface corrosion on exhaust diffuser 1-150-110-01 is allowable and shall be removed by wire brushing to remove surface scale; then area shall be cleaned with dry cleaning solvent (item 28, table 2-2) and touched up as instructed in paragraph 7-142. Extreme corrosion, resulting in metal breakthrough, is cause for rejection and engine shall be shipped to Overhaul.

d. Inspect outer cone for cracks.

(1) Any number of tight-lipped cracks not exceeding 1/2 inch in length that do not affect weldments are acceptable without repair.

(2) Two tight-lipped, nonconvergent cracks up to one inch long that do not affect weldments are acceptable after stop drilling.

e. Inspect mid and inner cones for cracks and burning.

(1) Any number of tight-lipped, nonconvergent cracks up to 1/2 inch in length that do not affect weldments are acceptable without repair.

(2) No burn-throughs are permitted. Weld repair as outlined in paragraph 7-139.

f. Inspect bearing housing support for cracks. Two tight-lipped, nonconvergent cracks up to 1/2 inch in length that do not affect weldments are acceptable without repair.

g. Inspect outer strut and outer strut fairing for nicks and dents, cracks, and burning.

(1) Nicks and dents that could prevent expansion movement of strut and fairing shall be repaired. Blend repair as outlined in paragraph 7-136.

(2) All nonconvergent cracks on outer strut fairing of exhaust diffuser 1-150-110-01 are acceptable without repair, provided they do not extend into spot-welded area at base of fairing.

(3) On exhaust diffusers 1-150-200-01 and 1-150-240-03, one crack per strut fairing is allowed up to 1-1/2 inches in length without repair. If limits are exceeded, replace exhaust diffuser.

(4) Any number of tight-lipped, nonconverge cracks not exceeding 1/2 inch in length that do not affect weldments are acceptable on outer strut without repair.

(5) No burn-throughs are permitted. Weld repair as outlined in paragraph 7-139.

h. Inspect inner strut flange for cracks.

(1) Any number of cracks not exceeding 1/2 inch in length that do not affect weldments are acceptable after stop drilling.

(2) Two tight-lipped, nonconvergent cracks to one inch long that do not affect weldments are acceptable on each of two struts after stop drilling.

i. Inspect exhaust thermocouple mounting studs on exhaust diffuser for damage or stripped threads. Replace as instructed in paragraph 7-155.

7-49. INSPECTION OF SECOND STAGE TURBINE ROTOR ASSEMBLY (T53-L-7/7A Engines). (See figures 6-13 and 6-14.) Proceed as follows:

a. Inspect turbine rotor shaft for positive conta seal tracking and residual deposits of coke, varni and carbon.

b. Visually inspect all parts for cracks, nicks, dents and other damage.

c. Inspect seal (2, figure 6-13, and 11, figure 6-14) for cuts, nicks, tears, cracks, distortion, p ability, and wear. If damage is noted, replace se

d. Using 7-power magnifying glass, visually inspect second stage turbine rotor assembly as foll

(1) Blade surfaces and leading and trailing edges for nicks, dents, and cracks. No cracks are allowed. No dents are allowed within 0.500 inch from blade platform.

(2) Blade tip (shroud end) for cracks and scoring. No cracks are allowed.

(3) Inspect turbine disc for cracks. No cra are allowed.

e. Inspect blade roots and turbine disc for circumferential rubs. Circumferential rubs are acceptable without repair as follows:

(1) Rubs may extend around entire circum ence (360 degrees) of disc face.

(2) Rubs are permitted only on disc and bl root surfaces as shown in figure 7-19.

(3) Rubs may have maximum depth of 0.0 inch.

f. Inspect for rubs between OD of power turbi forward seal flange and ID of power turbine nozz air seal. Rubs are permitted if clearance requirements are met as outlined in paragraph 8-63.

g. If engine oil consumption is excessive (re applicable airframe manual) and the following conditions exist, replace No. 3 bearing seal.

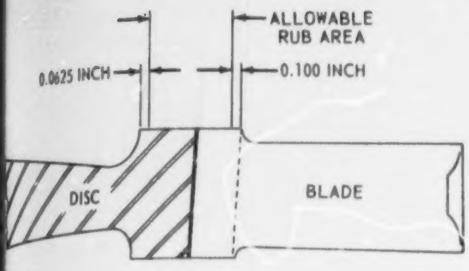

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Figure 7-19. Second Stage Turbine Rotor - Rub Limits (T53-L-7/7A)

(1) Oil is observed dripping from aft end of ne or tailpipe after shutdown.

(2) Excessive exhaust smoke is noticed during e operation.

(3) Thick deposit of soft wet carbon is observed oling air deflector near the bolt holes.

. Inspect blades for axial blade movement. Max- n acceptable blade movement is 0.009 inch ured at blade root.

Pressure-test bearing housing (15, figure 6-14) ower turbine oil tubes (4, figure 6-9) as follows:

(1) Install pressure test fixture (LTCT3694 or T4145) on bearing housing.

(2) Screw in two power turbine oil tubes (4) ighten to 90 to 110 pound-inches torque. To nt air leakage, plug one of the tubes with pack- NAS617-6, and plug (1-150-001-01).

(3) Install packing (13), adapter (12), packing nd power turbine oil strainer housing (7) into gged tube.

NOTE

Oil nozzle (10) is not to be installed during pressure test.

NOTE

In following step (4), no leakage is allowed. Replace bearing housing if leakage is evident.

(4) Apply 30 psig air pressure to power turbine oil strainer housing (7). Check for leakage by immersing bearing housing in water or oil.

(5) Remove pressure test fixture.

(6) Remove power turbine oil strainer housing (7), packing (11), adapter (12), and packing (13).

(7) Remove plug (1-150-001-01) and packing, NAS617-6, from tube.

(8) Remove power turbine oil tubes (4).

7-50. INSPECTION OF FIRST STAGE TURBINE ROTOR ASSEMBLY (T53-L-7/7A Engines). (See figure 3-21.)

CAUTION

Use extreme care when cleaning first stage turbine rotor to prevent abrasion of the aluminum coating on the blades.

NOTE

Before cleaning first stage turbine blades or disc, inspect disc for a thick deposit of hard glazed carbon on forward face. If such a deposit is found, replace rear bearing seal (6, figure 3-23).

a. Clean first stage turbine blades with dry-cleaning solvent (item 28, table 2-2) as necessary to expose the metal. Using 7-power magnifying glass, visually inspect each blade for cracks. No cracks allowed.

b. (Deleted)

c. (Deleted)

Pages 7-40 and 7-41, including figures 7-20 and 7-21, deleted.

d. Inspect for dents or nicks as follows:

(1) The following are acceptable without repair. (See figures 7-22 and 7-23.)

NOTE

Damage is permissible on both walls of hollow core.

(a) Dents or nicks in blade areas A and B, any length, and maximum depth of 0.020 inch.

(b) Dents and/or nicks in blade area C, with maximum length of 0.040 inch and maximum depth or 0.020 inch.

(c) Dents or nicks in blade area D, with maximum length of 0.300 inch and maximum depth of 0.100 inch.

(d) Dents located in trailing edge, with maximum displacement of 0.100 inch.

(2) The following are acceptable with minor repairs. (See figure 7-22.) Blend repair as outlined in paragraph 7-136.

(a) Dents or nicks in leading edge, with maximum depth of 0.062 inch.

(b) Nicks in trailing edge, with maximum length of 0.375 inch and maximum depth of 0.125 inch.

NOTE

Repair is limited to removal of burrs or minor projections without further damage to blade plating.

e. Inspect for tip-type and circumferential-type rubs as follows:

NOTE

Tip rubs are distinguished by localized scuffing or burring of the tips.

(1) Tip rubs are acceptable without repair when all other blade damage is within limits, and tip clearance is as given in table 11-4, reference number 11.

(2) Circumferential rubs are acceptable without repair as follows:

(a) Rubs that are located on forward rim face of rotor.

(b) Rubs may extend around entire circumference (360 degrees) of rotor.

(c) Rubs may have maximum width of 0.100 inch and maximum depth of 0.020 inch.

f. Inspect blades for evidence of environmentally caused erosion. All erosion is acceptable, provided that blades pass all other inspections.

g. Inspect disc for cracks. No cracks are allowed.

h. Inspect aft side of rotor for blades or blade wedges recessed below disc in excess of 0.025 inch. If one or more blades are recessed more than 0.025 inch, reseat as outlined in paragraph 7-157.

7-51. INSPECTION OF AIR DEFLECTOR AND COMBUSTION CHAMBER DEFLECTOR (T53-L-7/7A Engines). (See figure 3-23.) Proceed as follo

NOTE

Do not remove first stage turbine rotor air deflector or combustion chamber deflector unless visual inspection warrants it or if necessary to replace.

a. Clean all parts as outlined in table 7-1.

b. Visually inspect first stage turbine rotor air deflector for cracks.

c. Visually inspect combustion chamber deflec 1-110-020-01, 1-110-020-02 or 1-110-020-06 for cracks. (See figure 7-24.)

(1) Cracks, in or next to the defelctor inner seam weld (Area A), less than 180 degrees are acceptable without repair.

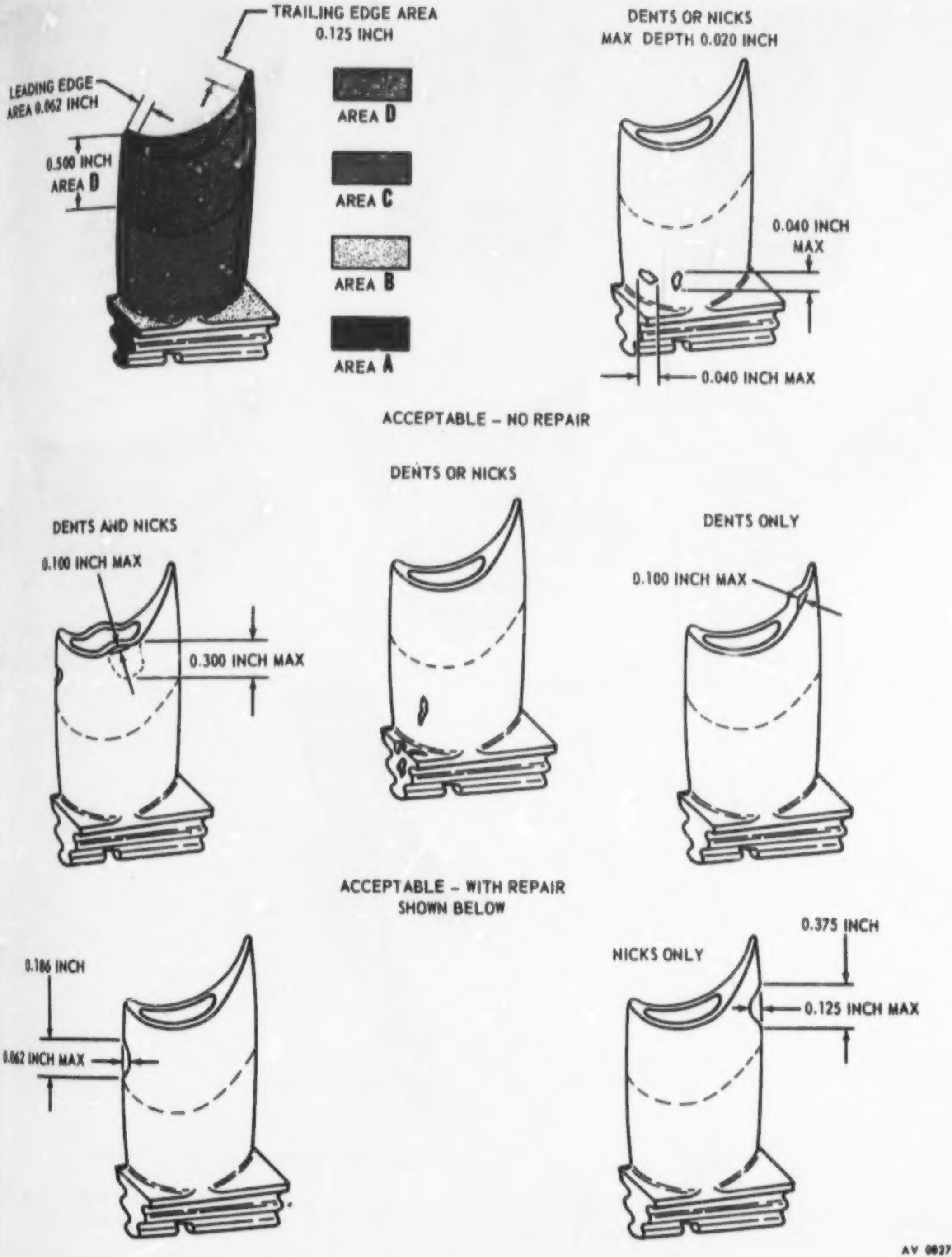
TRAILING EDGE AREA
0.125 INCH
LEADING EDGE AREA 0.062 INCH
0.500 INCH AREA D
AREA D
AREA C
AREA B
AREA A
DENTS OR NICKS
MAX DEPTH 0.020 INCH
0.040 INCH MAX
0.040 INCH MAX
ACCEPTABLE - NO REPAIR
DENTS OR NICKS
DENTS AND NICKS
0.100 INCH MAX
0.300 INCH MAX
DENTS ONLY
0.100 INCH MAX
ACCEPTABLE - WITH REPAIR SHOWN BELOW
0.186 INCH
0.062 INCH MAX
NICKS ONLY
0.375 INCH
0.125 INCH MAX
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Figure 7-22. First Stage Turbine Blade - Acceptable Dent and Nick Limits (T53-L-7/7A)

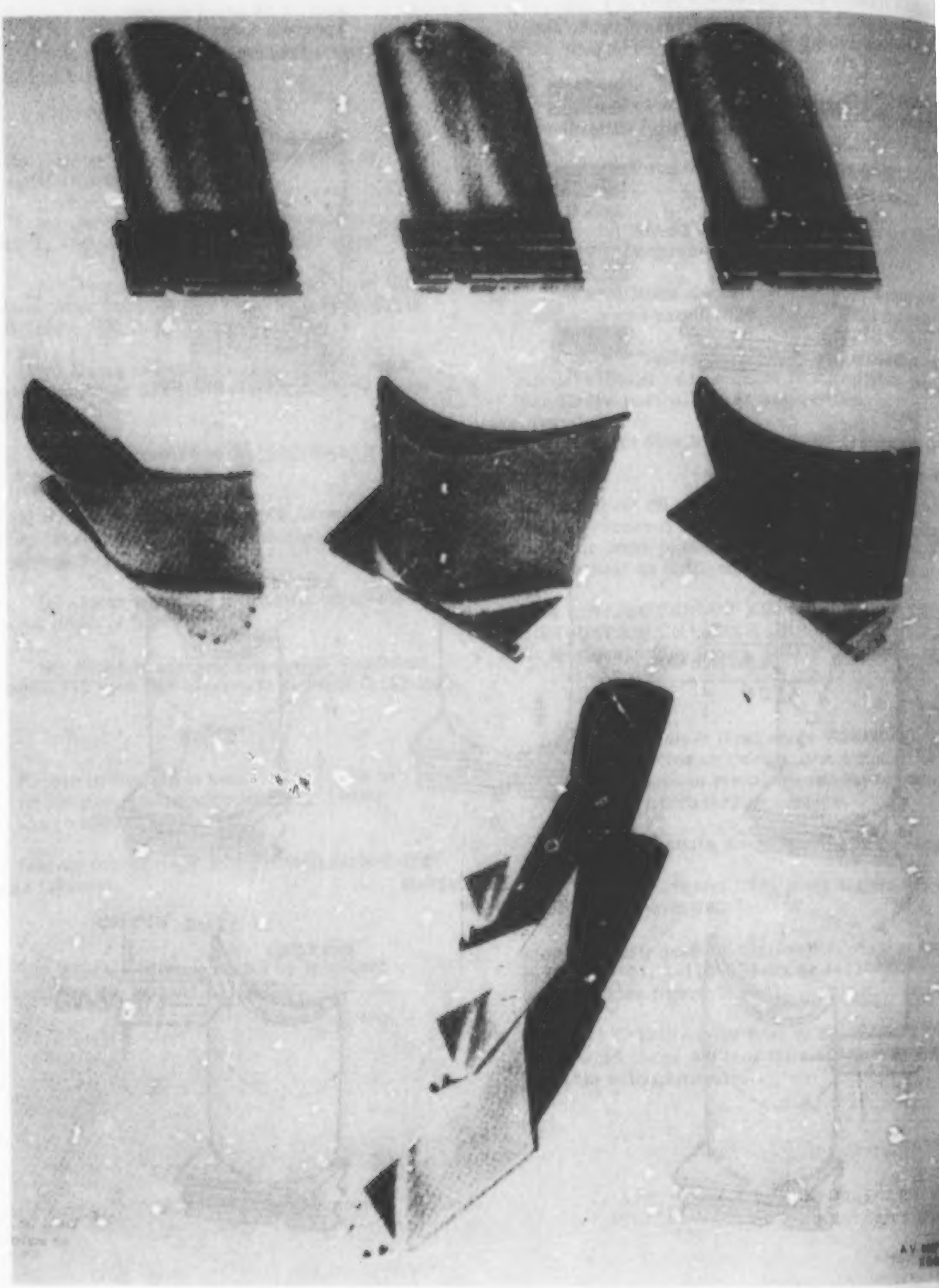

Figure 7-23. First Stage Turbine Blade - Acceptable Dents and Nicks (T53-L-7/7A) (Typical)

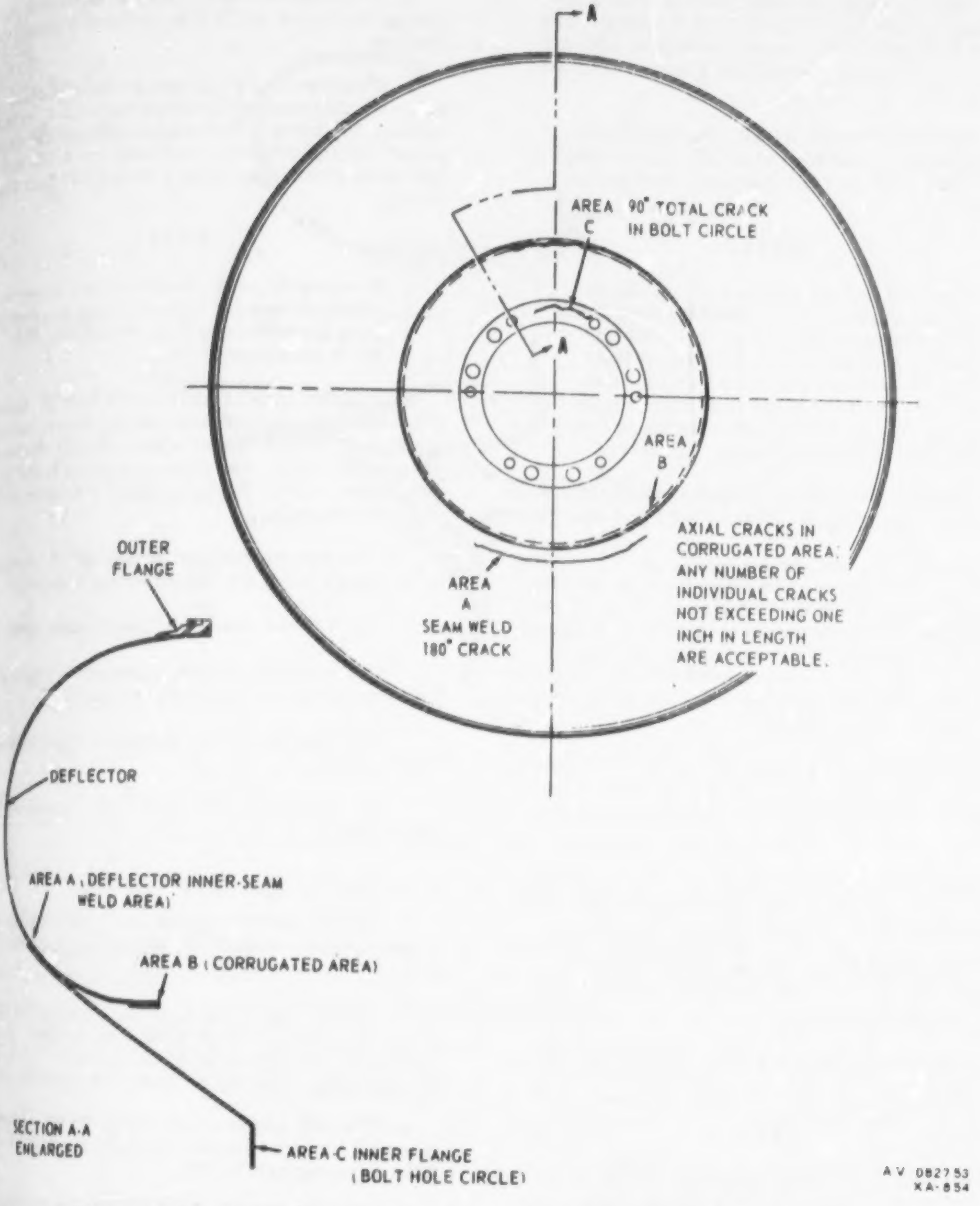
A
AREA C
90° TOTAL CRACK IN BOLT CIRCLE
A
AREA B
AXIAL CRACKS IN CORRUGATED AREA: ANY NUMBER OF INDIVIDUAL CRACKS NOT EXCEEDING ONE INCH IN LENGTH ARE ACCEPTABLE.
OUTER FLANGE
AREA A
SEAM WELD 180° CRACK
DEFLECTOR
AREA A (DEFLECTOR INNER-SEAM WELD AREA)
AREA B (CORRUGATED AREA)
SECTION A-A ENLARGED
AREA C INNER FLANGE (BOLT HOLE CIRCLE)
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Figure 7-24. Combustion Chamber Deflector - Crack Limits (T53-L-7/7A)

(2) Any number of axial cracks, not exceeding ch, are allowed in corrugated area (Area B).

(3) Cracks are allowed in the bolt hole circle C), provided that they do not total more than rees.

(4) If length of cracks 1/8 inch wide or wider s 180 degrees, combustion chamber deflector e rejected.

(5) Repair or replace combustion chamber deflector if crack limits are exceeded.

d. Visually inspect combustion chamber deflector 1-110-440-01 or 1-110-440-02 for cracks. Cracks in the spot welds adjacent to the corrugated area (Area B) are acceptable provided that the support is not separated from deflector (curl).

7-52. INSPECTION OF FIRST STAGE TURBINE NOZZLE ASSEMBLY (T53-L-7/7A Engines). (See figures 6-17 and 7-25.) Inspect assembly with aid of the 5- to 7- power magnifying glass as outlined in table 7-5.

7-53. INSPECTION OF REAR BEARING SEAL, SEAL HOUSING, LINER, AND DIFFUSER HOUSING OIL TUBES (T53-L-7/7A Engines). Proceed as follows:

NOTE

> Fresh oil on forward face of first stage turbine rotor disc or carbon residue from oil adhering to aft face of rear bearing seal or seal housing is allowed. A thick deposit of hard, glazed carbon on either the forward face of the first stage turbine rotor disc or the aft face of the rear bearing seal or seal housing is not allowed.

a. Inspect forward face of first stage turbine rotor disc and aft faces of rear bearing seal and seal housing.

b. Inspect seal housing for nicks, dents, cracks, scratches, liner burrs, and other damage. Replace seal and/or seal housing, if damaged. Replace seal if conditions established in preceding step a. cannot be met or if, during engine operation, acceptable rate of oil consumption is exceeded (refer to applicable airframe manual) and excessive smoke is noticed from exhaust end or tailpipe.

c. Inspect diffuser housing oil tubes for cracks and braze failures at mating points of tubes to housing. Braze-repair cracks as outlined in paragraph 7-161.

d. Inspect seal liner (1, figure 3-23) for scoring of plated area. Replace liner if scoring of plated area is observed or if other damage is noted.

7-54. INSPECTION OF COMBUSTOR TURBINE ASSEMBLY (T53-L-15/701 Engines). (See figure 3-24.) Proceed as follows:

a. Inspect combustor turbine assembly for visible damage.

NOTE

> Burning and/or distortion in line with one or more main fuel nozzles or starting fuel nozzles is evidence of clogging of fuel system components. Investigate and replace affected components as outlined in applicable paragraphs.

b. If damage is noted, refer to applicable pa graphs for limits and replacement of damaged co ponents.

c. Check second stage gas producer turbine rotor tip clearance as given in table 11-4, refere number 78, using a feeler gage; and second stage power turbine rotor tip clearance for 0.025 inch minimum clearance, using a bent 0.025 inch dia wire.

NOTE

> If cracks in power shaft bolt are suspected when performing following step d., perform magnetic-particle inspection. (Refer to paragraph 7-30.)

d. Visually inspect power shaft bolt (5, figure 3-24) for damaged threads, nicks, burrs, cracks mutilation. Repair minor thread damage (refer to paragraph 7-138), and nicks and burrs (refer to paragraph 7-136). Replace bolt if cracks or muti tion are noted.

dA. Inspect internal wrenching nut (5, figure 3 or 6, figure 3-24) for the following damage:

(1) Thread damage - blend repair minor

(2) Wrenching surface damage - reject if than one surface exhibits deformation.

(3) Mating surface damage - blend smooth emery paper.

(4) Cracks in thin-wall area - remove wi small file.

(5) Cracks in any other area - reject nut.

e. Inspect seal (7, figure 3-24) for cuts, nic tears, cracks, distortion, pliability, and wear. damage is noted, replace seal.

7-55. INSPECTION OF V-BAND COUPLING AS BLY, OIL STRAINER HOUSING ADAPTER, PO TURBINE TUBES, AND FIRE SHIELD (T53-L- 701 Engines). (See figure 6-18.) Proceed as fol

a. Visually inspect threaded parts for cross damaged threads. Repair damaged threads as o lined in paragraph 7-138.

b. Visually inspect parts for cracks or dist Replace all parts that are damaged or distorted repair.

c. Visually inspect fire shield for cracks or ting from the lockplate areas. Cracks are acc able, provided the following is adhered to:

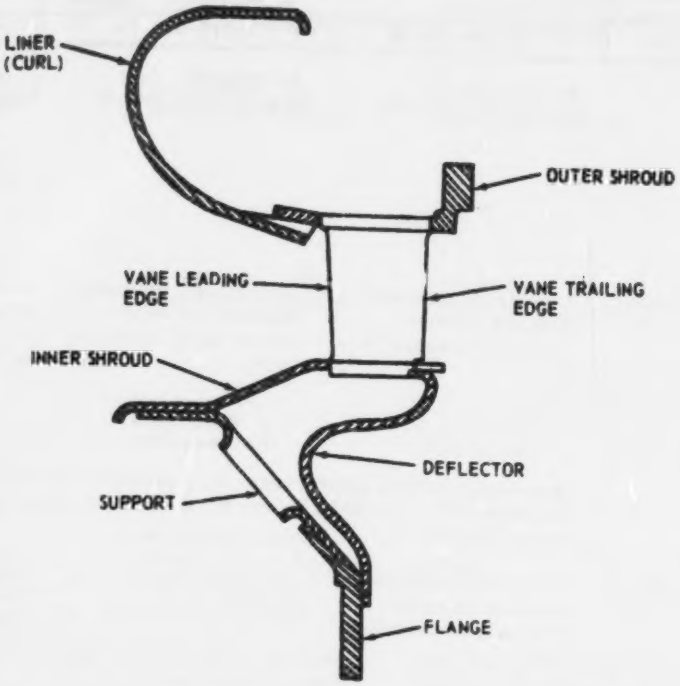
LINER
(CURL)
OUTER SHROUD
VANE LEADING EDGE
VANE TRAILING EDGE
INNER SHROUD
DEFLECTOR
SUPPORT
FLANGE

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Figure 7-25. First Stage Turbine Nozzle Assembly (T53-L-7/7A)

Table 7-5. First Stage Turbine Nozzle and Flange Assembly - Inspection Limits

EP NO.	DEFECT	FIG. NO.	INSPECTION LIMITS		
			1-110-030-28	1-110-030-34	1-110-030-36
			VANE TRAILING EDGE		
1.	Axial Cracks	7-26 Detail A	Any number of cracks, each up to 5/8 inch long, are acceptable on each vane	Any number of cracks, each up to 1/2 inch long, are acceptable on each vane **NOTE** One axial crack up to 3/4 inch long is acceptable on each vane in addition to above limits.	Any number of cracks, each up to 5/8 inch long, are acceptable on each vane
2.	Diagonal Cracks Extending From Vane Trailing Edge to Inner Shroud		Acceptable. No inspection required	Acceptable. No inspection required	Acceptable. No inspection required

Table 7-5. **First Stage Turbine Nozzle and Flange Assembly - Inspection Limits (Cont)**

STEP NO.	DEFECT	FIG. NO.	INSPECTION LIMITS		
			1-110-030-28	1-110-030-34	1-110-030-38
3.	Diagonal Cracks Extending From Vane Trailing Edge to Outer Shroud		Acceptable. No inspection required	Acceptable. No inspection required	eptable. No inspection required
4.	Converging Trailing Edge Cracks	Detail C	Acceptable, provided distance between cracks is at least 1/4 inch	Acceptable, provided distance between cracks is at least 1/4 inch	Acceptable, provided distance between cracks is at least 1/4 inch
			CAUTION Converging cracks which create the possibility of material fallout are not permitted. If cracks appear to be radiating towards one another, reject nozzle.		
5.	Converging Cracks From Opposite Edges	Detail D	Acceptable, provided distance between cracks is at least 1/4 inch	No inspection required	Acceptable, provided distance between cracks is at least 1/4 inch
6.	(Deleted)				
7.	Cracks Originating in Burned Areas	Detail E	Any number of cracks, each up to 5/8 inch long are acceptable on each vane	Any number of cracks, each up to 1/2 inch long, are acceptable on each vane	Any number of crack each up to 5/8 inch long, are acceptable on each vane
			NOTE Crack length shall be measured from unaffected vane trailing edge.		
8.	Burned Areas (Loss of Material)	Detail F	Burned areas up to 5/8-inch radial length by 3/8-inch axial length are acceptable on six vanes **NOTE** One of these areas may be 1/2 inch by 1/2 inch instead of 5/8 inch by 3/8 inch.	Burned areas up to 5/8-inch radial length by 3/8-inch axial length are acceptable on seven vanes	Burned areas up to 5/8-inch radial lengt by 3/8-inch axial length are acceptable on six vanes **NOTE** One of these areas be 1/2 inch by 1/2 instead of 5/8 inch by 3/8 inch.
9.	Axial Cracks	7-27 Detail A	Any number of cracks are acceptable, provided they do not penetrate vane core	One crack up to 3/4-inch long is acceptable, provided it does not penetrate vane core	Any number of cra are acceptable, provided they do not penetrate vane core

Table 7-5. **First Stage Turbine Nozzle and Flange Assembly - Inspection Limits** (Cont)

STEP NO.	DEFECT	FIG. NO.	INSPECTION LIMITS		
			1-110-030-28	1-110-030-34	1-110-030-36
10.	Diagonal Cracks Extending From Vane Leading Edge to Inner Shroud		Acceptable. No inspection required	Acceptable. No inspection required	Acceptable. No inspection required
11.	Diagonal Cracks Extending From Vane Leading Edge to Outer Shroud		Acceptable. No inspection required	Acceptable. No inspection required	Acceptable. No inspection required
12.	Converging Leading Edge Cracks		Not permitted	Acceptable	Not permitted
13.	Converging Cracks From Opposite Edges		Acceptable, provided distance between cracks is at least 1/4 inch	No inspection required	Acceptable, provided distance between cracks is at least 1/4 inch
14.	Radial Cracks	Detail C	Any number or size cracks are acceptable, provided they do not penetrate vane core	Any number or size cracks are acceptable, provided they do not penetrate vane core	Any number or size are acceptable, provided they do not penetrate vane core
15.	Cracks Originating in Burned Areas	Detail D	Any number of cracks are acceptable, provided they do not penetrate vane core	One crack is acceptable, provided it does not penetrate vane core	Any number of cracks are acceptable, provided they do not penetrate vane core
16.	Burned Areas	Detail E	Burned areas up to 5/8-inch radial length by 1/8-inch axial length are acceptable on six vanes	Burning is acceptable, provided core is not penetrated	Burned areas up to 5/8-inch radial length by 1/8-inch axial length are acceptable on six vanes
17.	Bowing		Acceptable. No inspection required	Acceptable. No inspection required	Acceptable. No inspection required
18.	Nicks, Dents, and Burrs		Acceptable following blend repair; no damage limit **NOTE** Minimize removal of material; blend repair only to remove surface projections and smooth damaged areas.	Acceptable. No damage limit **NOTE** Minimize removal of material; blend repair only to remove surface projections.	Acceptable following blend repair; no damage limit

Table 7-5. First Stage Turbine Nozzle and Flange Assembly - Inspection Limits (Cont)

STEP NO.	DEFECT	FIG. NO.	INSPECTION LIMITS		
			1-110-030-28	1-110-030-34	1-110-030-3
19.	Spalling	-	No inspection required	Any amount acceptable on all vanes	Any amount acceptab on all vanes
20.	Crazing	-	No inspection required	Acceptable on all areas of all vanes	Acceptable on all are of all vanes
			OUTER SHROUD AREA		
21.	Outer Shroud Cracks		Acceptable. No inspection required	Ten cracks, each up to 1/2 inch in length allowed. Converging cracks not permitted	Acceptable. No inspection required
			INNER SHROUD AREA		
22.	Inner Shroud Cracks		Acceptable. No inspection required	Ten cracks, not exceeding 1/2 inch in length, allowed. Converging cracks not permitted	Acceptable. No inspection required
			LINER (CURL)		
23.	Axial Cracks	7-28	Any number of cracks, each up to one inch in length, are allowed, provided no circumferential cracks are present	Any number of cracks, each up to one inch in length are allowed, provided no circumferential cracks are present	Any number of crac each up to one inch i length are allowed, provided no circumferential cracks are present
24.	Converging Cracks	7-28	Not permitted	Not permitted	Not permitted
25.	Circumferential Cracks	7-28	Any number of cracks up to accumulative crack length of 3 inches are acceptable, provided no axial cracks are present	Any number of cracks up to accumulative crack length of 3 inches are acceptable, provided no axial cracks are present	Any number of crac up to accumulative crack length of 3 inches are acceptab provided no axial cracks are presen
26.	Wear Depressions, Cracks in Curl OD		Wear depressions caused by rubbing of combustion chamber liner dimples are acceptable provided no break-through or raised impressions are evident or curl ID. Circumferential cracks are not allowed. Repair axial cracks or unacceptable wear depressions	Wear depressions caused by rubbing of combustion chamber liner dimples are acceptable provided no break-through or raised impressions are evident on curl ID. Circumferential cracks are not allowed. Repair axial cracks or unacceptable wear depressions	Wear depressions caused by rubbing o combustion chamber liner dimples are ac ceptable provided n break-through or raised impressions are evident on curl ID. Circumferenti cracks are not allowed. Repair axi cracks or unaccept able wear depres sions

Table 7-5. First Stage Turbine Nozzle and Flange Assembly - Inspection Limits (Cont)

STEP NO.	DEFECT	FIG. NO.	INSPECTION LIMITS		
			1-110-030-28	1-110-030-34	1-110-030-36
			SUPPORT TO INNER SHROUD		
27.	Cracks	7-29	No cracks permitted; forward nozzle to overhaul for repair	No cracks permitted; forward nozzle to overhaul for repair	No cracks permitted; forward nozzle to overhaul for repair
			DEFLECTOR		
28.	Radial Cracks	7-30	Any number of cracks, each up to 1.500 inches in length, are acceptable	Any number of cracks, each up to 1.500 inches in length, are acceptable	Any number of cracks, each up to 1.500 inches in length, are acceptable
29.	Circumferential Cracks	7-30	Not permitted in deflector-to-inner-shroud brazement	Not permitted in deflector-to-inner shroud brazement	Not permitted in deflector-to-inner shroud brazement
30.	Converging Cracks	7-30	Not permitted	Not permitted	Not permitted
31.	Rubbing	7-30	Not permitted on trailing edge of inner shroud; replace nozzle	Not permitted in trailing edge of inner shroud; replace nozzle	Not permitted on trailing edge of inner shroud; replace nozzle
32.	Radial Cracks at Bolt Holes of Nozzle and Flange	6-17, 7-30	Cracks radiating inward or outward from bolt holes are acceptable	Cracks radiating inward or outward from bolt holes are acceptable	Cracks radiating inward or outward from bolt holes are acceptable
33.	Circumferential Cracks at Bolt Holes of Nozzle and Flange	6-17, 7-30	Not permitted	Not permitted	Not permitted

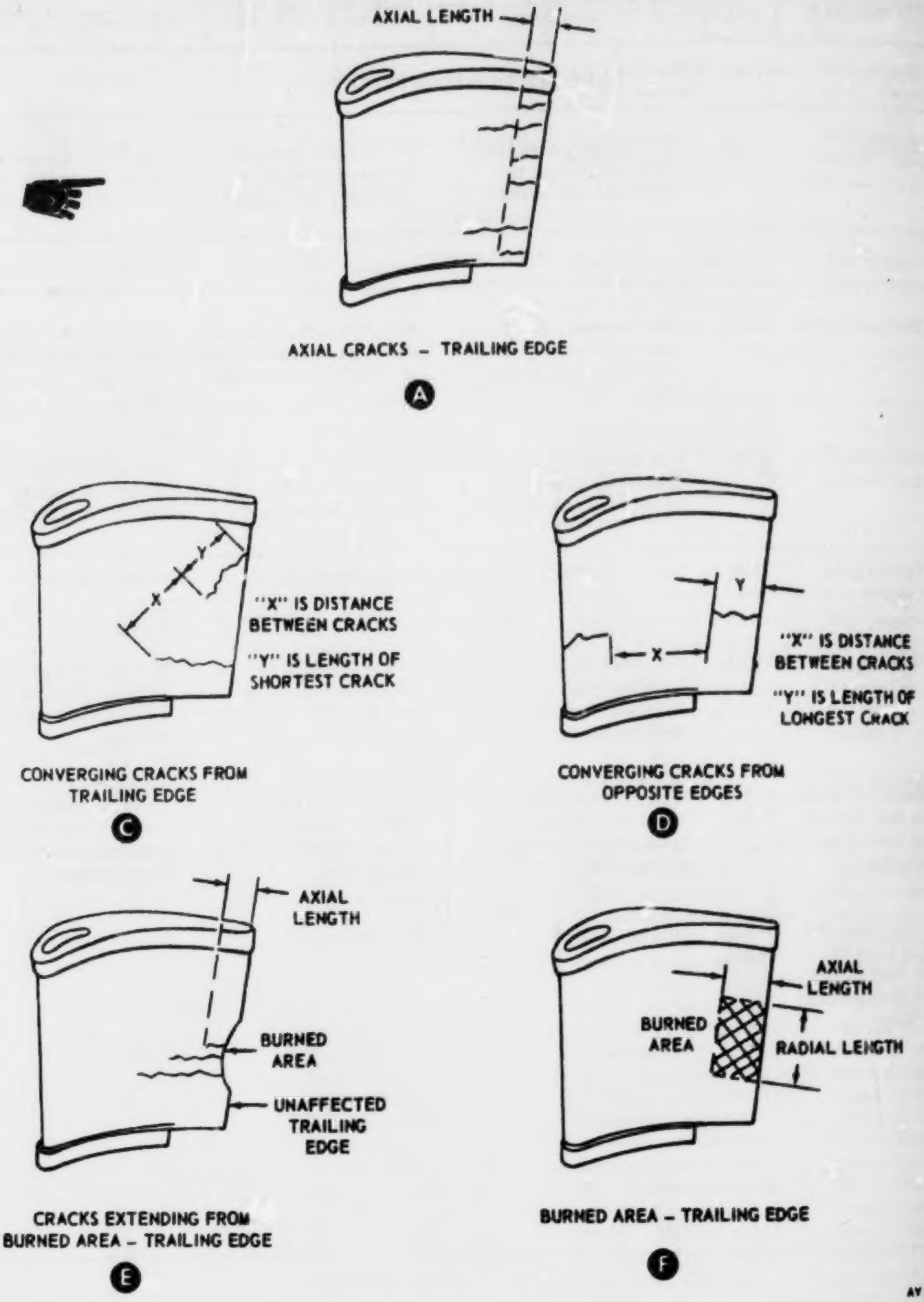
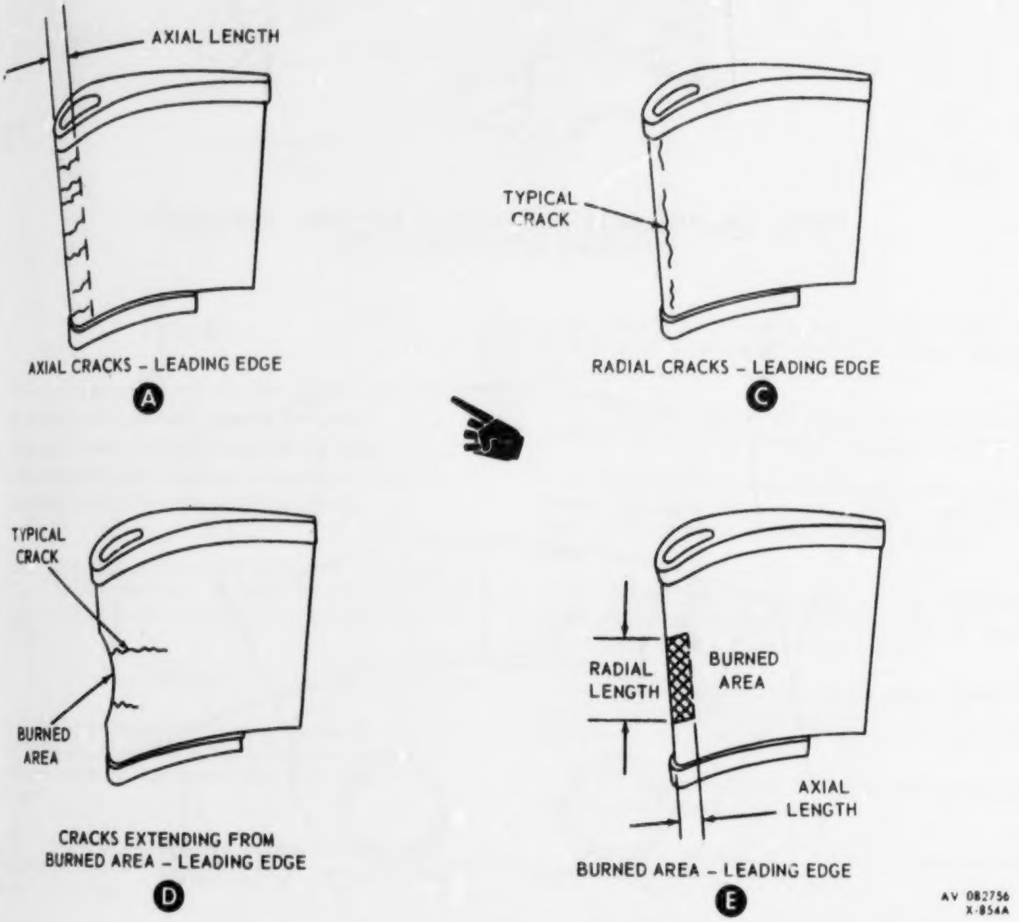

AXIAL LENGTH
AXIAL CRACKS – TRAILING EDGE
A
X
Y
"X" IS DISTANCE BETWEEN CRACKS
"Y" IS LENGTH OF SHORTEST CRACK
CONVERGING CRACKS FROM TRAILING EDGE
C
Y
X
"X" IS DISTANCE BETWEEN CRACKS
"Y" IS LENGTH OF LONGEST CRACK
CONVERGING CRACKS FROM OPPOSITE EDGES
D
AXIAL LENGTH
BURNED AREA
UNAFFECTED TRAILING EDGE
CRACKS EXTENDING FROM BURNED AREA – TRAILING EDGE
E
AXIAL LENGTH
BURNED AREA
RADIAL LENGTH
BURNED AREA – TRAILING EDGE
F

Figure 7-26. First Stage Turbine Nozzle Assembly - Vane Trailing Edge Inspection Areas (T53-L-7/7A)


AXIAL LENGTH
TYPICAL CRACK
TYPICAL CRACK
BURNED AREA
RADIAL LENGTH
BURNED AREA
AXIAL LENGTH
AV 082756
X-854A

AXIAL CRACKS - LEADING EDGE
Ⓐ

RADIAL CRACKS - LEADING EDGE
Ⓒ

CRACKS EXTENDING FROM BURNED AREA - LEADING EDGE
Ⓓ

BURNED AREA - LEADING EDGE
Ⓔ

Figure 7-27. First Stage Turbine Nozzle Assembly - Vane Leading Edge Inspection Areas (T53-L-7/7A)

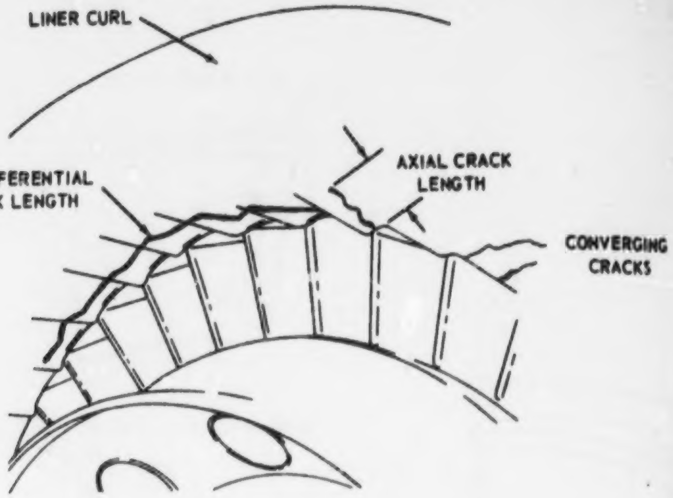

LINER CURL
AXIAL CRACK LENGTH
CIRCUMFERENTIAL CRACK LENGTH
CONVERGING CRACKS

Figure 7-28. First Stage Turbine Nozzle Assembly - Liner (Curl) Inspection Areas (T53-L-7/7A)

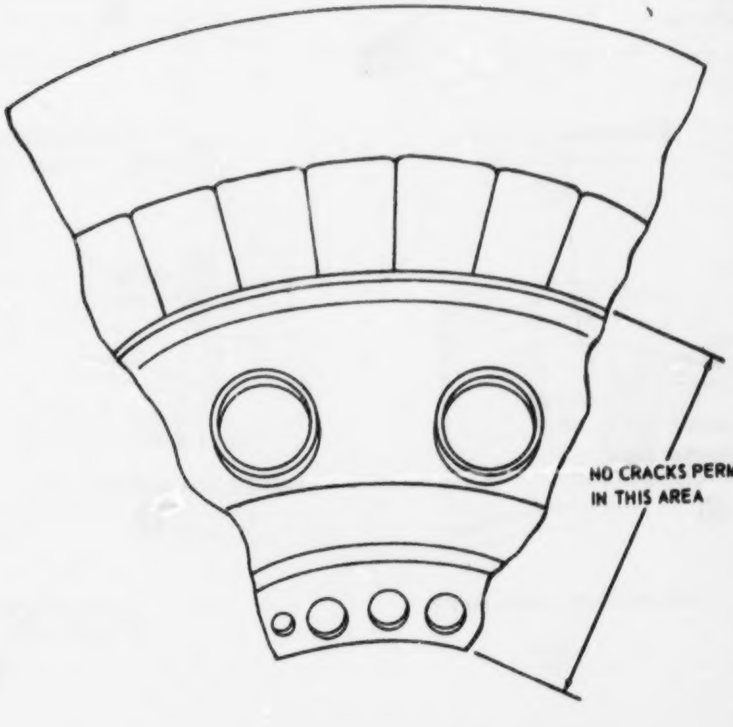

NO CRACKS PERMITTED IN THIS AREA

Figure 7-29. First Stage Turbine Nozzle Assembly - Support to Inner Shroud Inspection Areas (T53-L-7/7A)

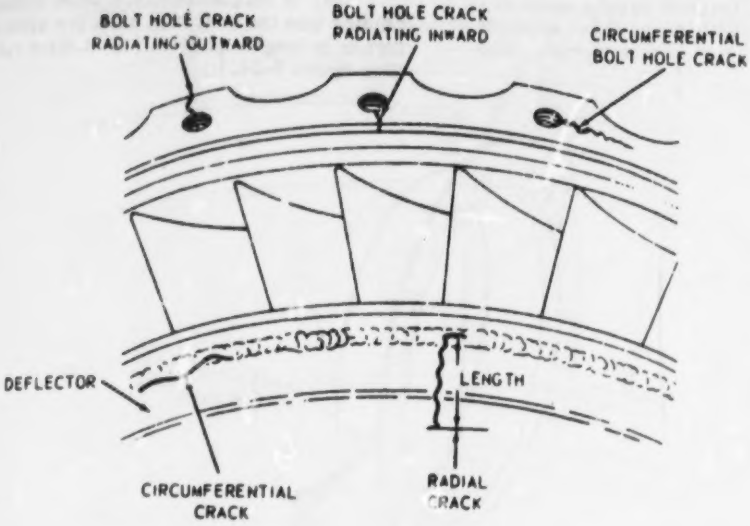

BOLT HOLE CRACK RADIATING OUTWARD
BOLT HOLE CRACK RADIATING INWARD
CIRCUMFERENTIAL BOLT HOLE CRACK
DEFLECTOR
LENGTH
CIRCUMFERENTIAL CRACK
RADIAL CRACK

Figure 7-30. First Stage Turbine Nozzle Assembly - Deflector Inspection Areas (T53-L-7/7A)

NOTE

When circumferential cracks appear on both sides in forward area of lockplate, this indicates cracking beneath surface. When such cracks appear, consider crack to affect width (one side) of lockplate.

(1) Cracks are acceptable extending along any sides of each lockplate. If more than two sides of er plate are affected, replace fire shield. (See ure 7-31.)

NOTE

Cracks emanating from below forward area of lockplate need not be stop-drilled unless visible portion is greater than one inch in length.

(2) Cracks up to one inch in length are accept- without repair, provided limits of preceding step are not exceeded.

(3) Cracks between 1 and 3 inches in length are eptable, provided they are stop-drilled and limits receding step (1) are not exceeded.

(4) If crack length exceeds the limit of eding step (3) or extends past a previous stop , and limits of step (1) are not exceeded, repair as ed in Paragraph 7-162.

(5) If above limits are exceeded, forward fire to next higher maintenance category for dis- ion.

7-56. INSPECTION OF EXHAUST DIFFUSER SUPPORT CONE ASSEMBLY (T53-L-15/701 Engines). (See figure 6-21.) Proceed as follows:

a. Visually inspect all parts for cracks and distortion. Replace distorted or damaged support cone.

b. Inspect all threaded parts for damaged threads. Repair damaged threads as outlined in paragraph 7-138. Replace parts having threads damaged beyond repair.

7-57. INSPECTION OF FIRST STAGE POWER TURBINE NOZZLE ASSEMBLY (T53-L-15/701 Engines). (See figure 6-18.) Proceed as follows:

a. Visually inspect first stage power turbine nozzle for cracks. (See figures 7-32, 7-33, and 7-34.) Replace nozzle if inspection limits are exceeded.

(1) Any number of 3/16 inch cracks are acceptable on trailing edge of vanes.

(2) Any number of 1/8 inch cracks are acceptable on leading edge of vanes.

(3) No inspection is required of inner and outer shroud to vane brazements. Cracks are allowed.

(4) Circumferential cracks up to one inch in length (cumulative) at joint or adjacent to joint are permitted. (See figure 7-32.) In addition, defects at joint or adjacent to joint, associated with cracks that travel through the inner shroud and into the seal ring area, are acceptable up to 5/8 inch in length (either side) as measured from radial portion of crack.

(5) Circumferential (vane to vane) cracks in parent metal on inner shroud between three adjacent vanes are permitted (maximum of nine vanes). *(See* figure 7-33.)

(6) A maximum of six inner shroud cracks e tending into the seal ring area are allowed up to inches in length, provided no turbine rub occurs. (See figure 7-34.)

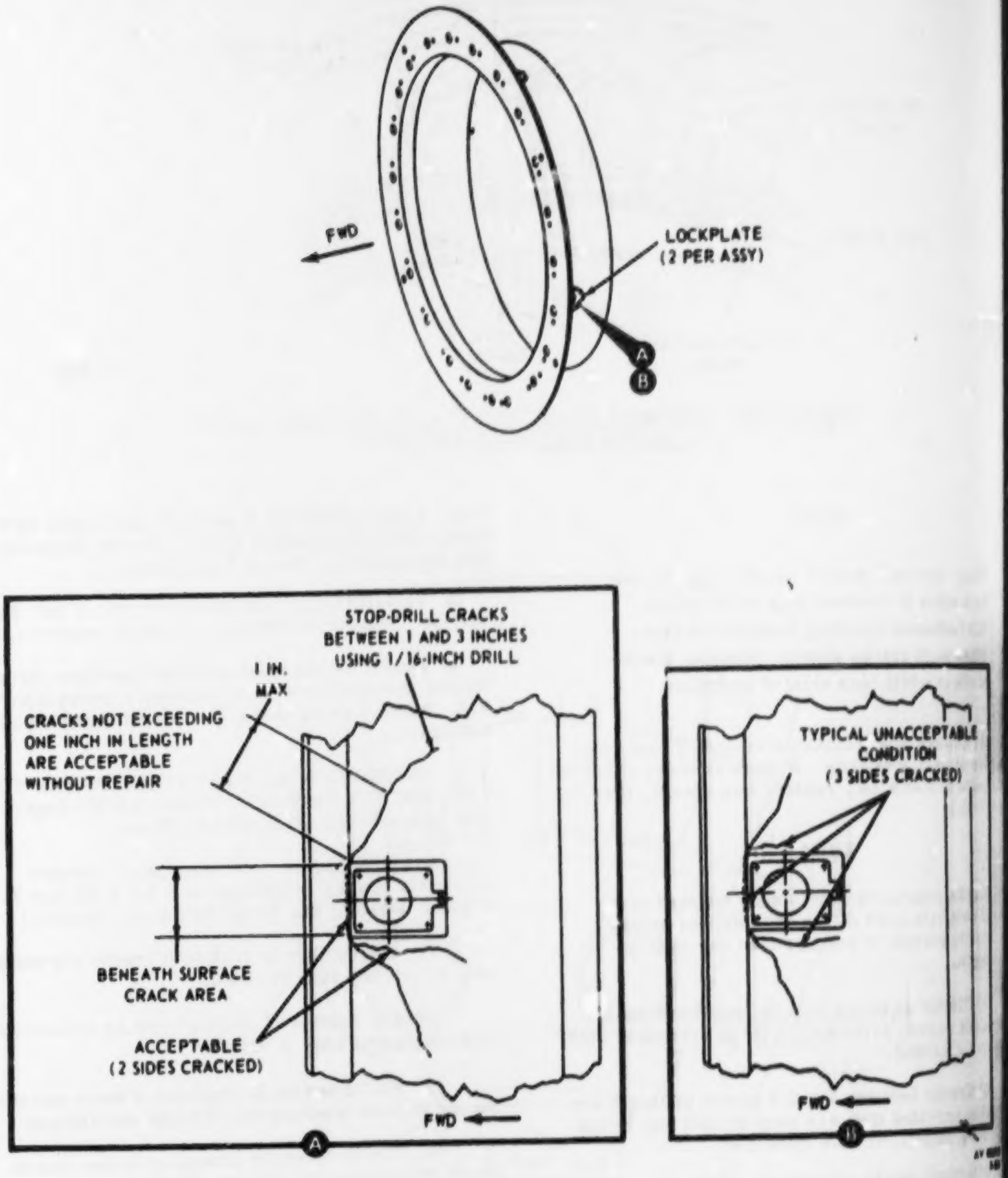

FWD
LOCKPLATE
(2 PER ASSY)
A
B
STOP-DRILL CRACKS
BETWEEN 1 AND 3 INCHES
USING 1/16-INCH DRILL
1 IN.
MAX
CRACKS NOT EXCEEDING
ONE INCH IN LENGTH
ARE ACCEPTABLE
WITHOUT REPAIR
BENEATH SURFACE
CRACK AREA
ACCEPTABLE
(2 SIDES CRACKED)
FWD
A
TYPICAL UNACCEPTABLE
CONDITION
(3 SIDES CRACKED)
FWD
B

Figure 7-31. Fire Shield Crack Inspection Limits (T53-L-15/701)

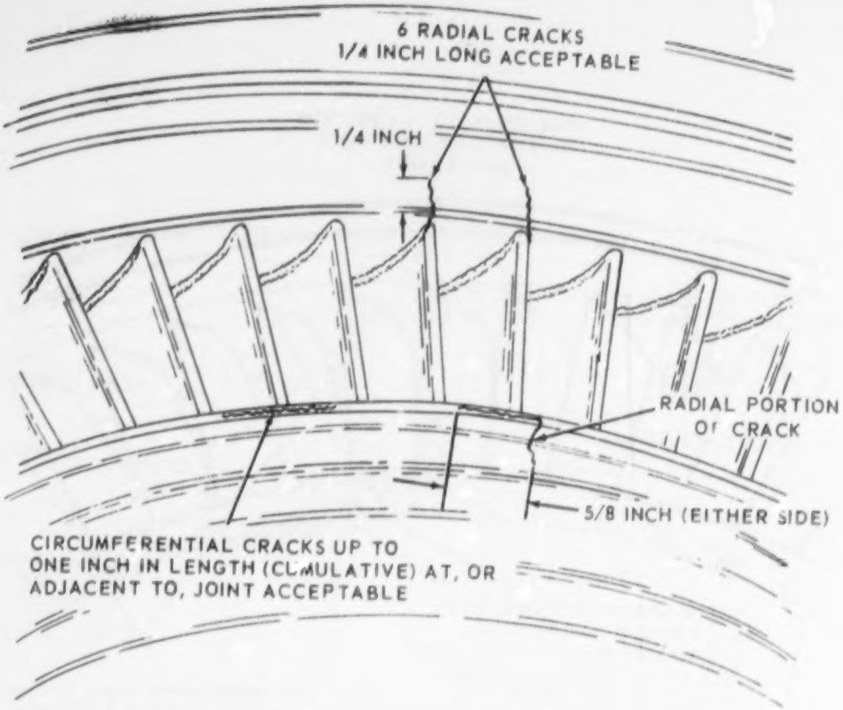


Figure 7-32. First Stage Power Turbine Nozzle - Inspection Limits for Sealing Rings and Leading Edge of Vanes (T53-L-15/701)

(7) On outer shroud ID and OD, a maximum of cracks are allowed that progress axially and adially, provided no crack progresses into or sealing area as shown in figure 7-34. Three al cracks exclusive of those that travel to the aling flange are allowed to progress from vane edge areas to the forward flange.

NOTE

Cracks noted in following steps (8) and (9) are allowed to be either part of or separate from step (7) cracking conditions. When inspecting, consider all possible combinations.

) On outer shroud leading edge, six 1/4 inch are allowed. (See figures 7-32 and 7-34.)

) On outer shroud trailing edge, ten 1/4 inch are allowed. (See figures 7-33 and 7-34.)

) Circumferential (vane to vane) cracks in roud between three adjacent vanes (maximum vanes) are allowed. (See figure 7-33.)

) Radial cracks at bolt holes are permitted.

) Cracks in seal brazement are not accept-

ually inspect first stage power turbine nozubs. Axial rubs resulting from contact with rotor are not permitted.

bA. Visually inspect nozzle area for grooves caused by the sealing rings. Grooves up to 0.020 inch in depth are acceptable for use, provided that sharp edges are blended to form a smooth contour. (See figure 7-34.)

c. Visually inspect vanes for dents, nicks, and burrs (see figure 7-35) as follows. Blend-repair as outlined in paragraph 7-136.

(1) A maximum of three nicks or dents are allowed on vane leading edge, provided that after blend repair, depth of any defect does not exceed 3/32 inch and length does not exceed 1/8 inch. Separation of defects shall be at least twice the length of the shortest defect after blend repair. Smooth dents within limits are acceptable without blend repair.

(2) A maximum of three nicks or dents are allowed on vane trailing edge, provided that after blend repair, depth of any defect does not exceed 3/32 inch and length does not exceed 1/8 inch. Separation of defects shall be at least twice the length of the shortest defect after blend repair. Smooth dents within limits are acceptable without blend repair.

(3) Random nicks and dents on vane airfoil surfaces are acceptable on all vanes. Blend repair to remove nicks.

(4) Burrs are acceptable on vane leading and trailing edges after blend repair.

d. Visually inspect nozzle vanes for burns. Burned vanes are not allowed.

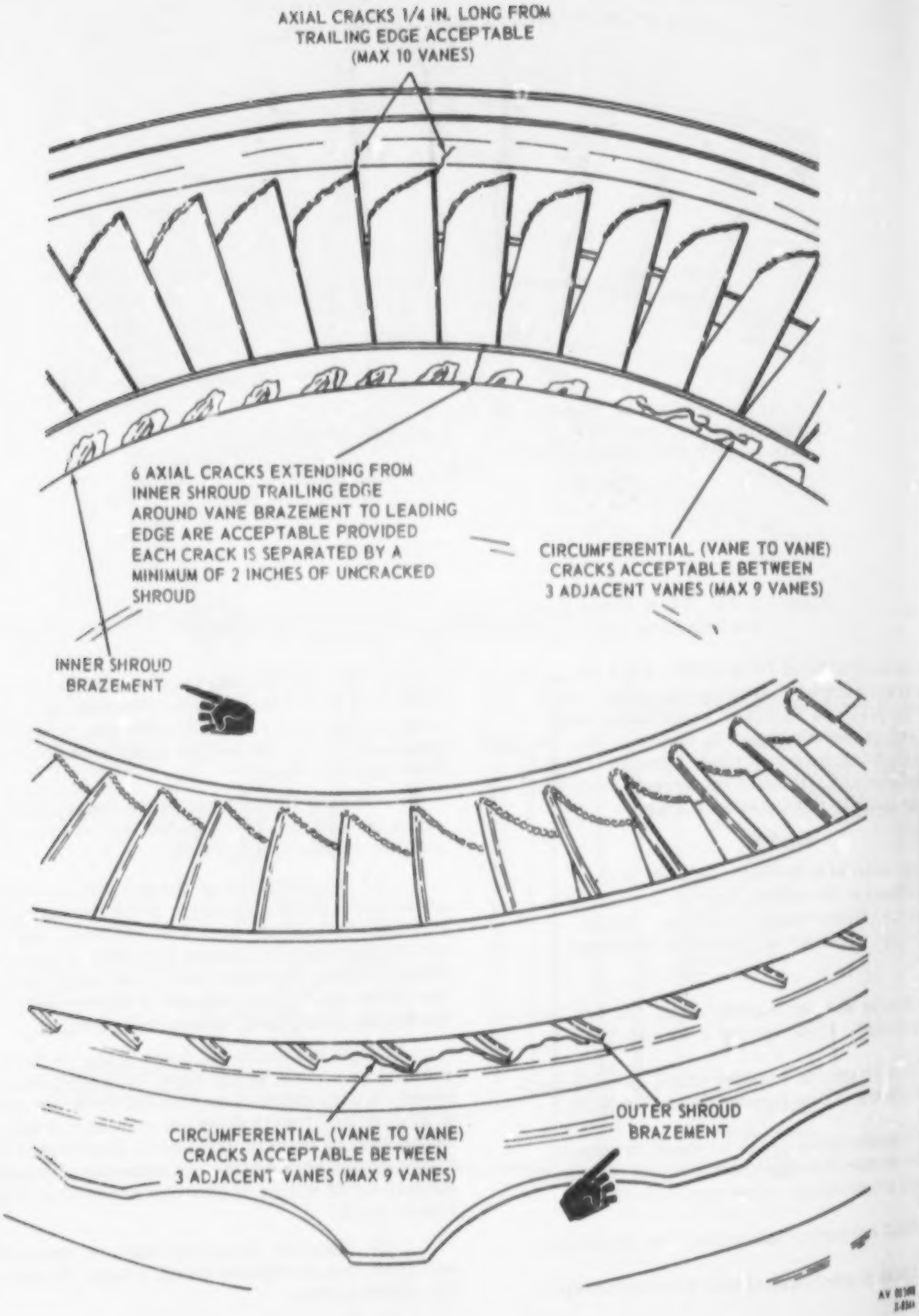

AXIAL CRACKS 1/4 IN. LONG FROM TRAILING EDGE ACCEPTABLE (MAX 10 VANES)
6 AXIAL CRACKS EXTENDING FROM INNER SHROUD TRAILING EDGE AROUND VANE BRAZEMENT TO LEADING EDGE ARE ACCEPTABLE PROVIDED EACH CRACK IS SEPARATED BY A MINIMUM OF 2 INCHES OF UNCRACKED SHROUD
CIRCUMFERENTIAL (VANE TO VANE) CRACKS ACCEPTABLE BETWEEN 3 ADJACENT VANES (MAX 9 VANES)
INNER SHROUD BRAZEMENT
CIRCUMFERENTIAL (VANE TO VANE) CRACKS ACCEPTABLE BETWEEN 3 ADJACENT VANES (MAX 9 VANES)
OUTER SHROUD BRAZEMENT

Figure 7-33. First Stage Power Turbine Nozzle - Inspection Limits on Inner and Outer Shroud Brazements (T53-L-15/701)

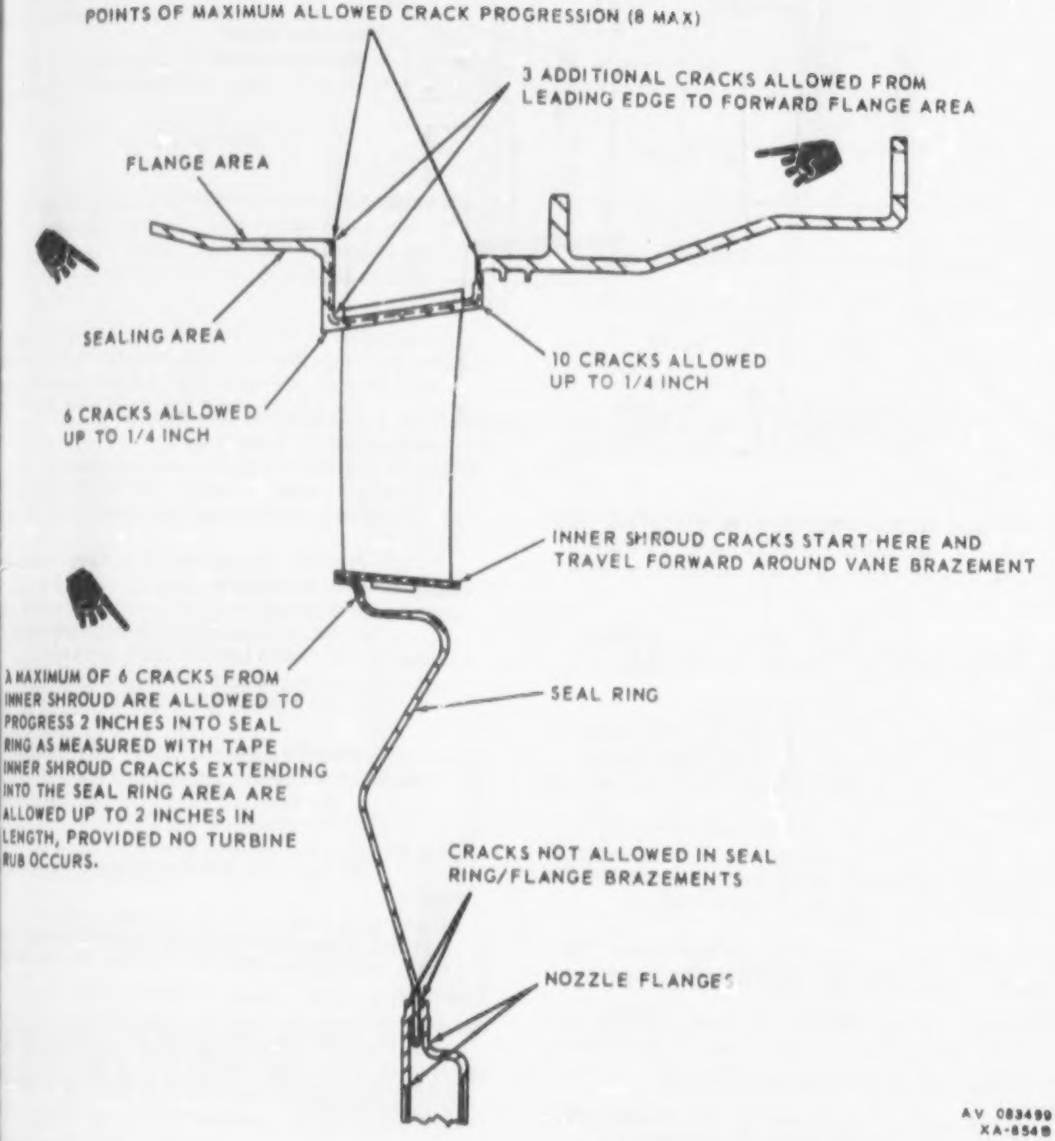

POINTS OF MAXIMUM ALLOWED CRACK PROGRESSION (8 MAX)
3 ADDITIONAL CRACKS ALLOWED FROM LEADING EDGE TO FORWARD FLANGE AREA
FLANGE AREA
SEALING AREA
10 CRACKS ALLOWED UP TO 1/4 INCH
6 CRACKS ALLOWED UP TO 1/4 INCH
INNER SHROUD CRACKS START HERE AND TRAVEL FORWARD AROUND VANE BRAZEMENT
A MAXIMUM OF 6 CRACKS FROM INNER SHROUD ARE ALLOWED TO PROGRESS 2 INCHES INTO SEAL RING AS MEASURED WITH TAPE INNER SHROUD CRACKS EXTENDING INTO THE SEAL RING AREA ARE ALLOWED UP TO 2 INCHES IN LENGTH, PROVIDED NO TURBINE RUB OCCURS.
SEAL RING
CRACKS NOT ALLOWED IN SEAL RING/FLANGE BRAZEMENTS
NOZZLE FLANGES
AV 083499
XA-654B

Figure 7-34. First Stage Power Turbine Nozzle - Inspection Limits for Cracks in Inner and Outer Shroud and Seal Ring (T53-L-15/701)

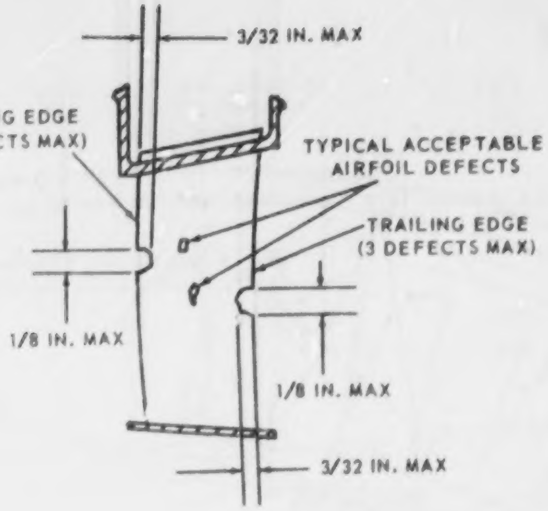


Figure 7-35. First Stage Power Turbine Nozzle - Inspection and Repair Limits for Nicks and Dents on Vane Leading and Trailing Edges (T53-L-15/701)

7-58. INSPECTION OF FIRST STAGE POWER TURBINE ROTOR, SEALING FLANGE, AND POWER TURBINE SPACER (T53-L-15/701 Engines). (See figure 6-18.) Proceed as follows:

a. Inspect sealing flange (6) for cracks or distortion. Replace flange if cracks or distortion are noted.

b. Inspect flange for local rubbing. Rub depth shall not exceed 0.015 inch for a circumferential length of 3 inches. Replace flange if rubbing exceeds inspection limits.

c. Inspect power turbine spacer (8) for scoring. Scoring shall not exceed 0.012 inch in depth. Replace spacer if scoring exceeds inspection limits.

d. Inspect spacer for cracks or distortion. Replace spacer if cracks or distortion are noted.

e. Using 7-power magnifying glass, visually inspect first stage power turbine rotor (7) as follows, and repair as outlined in paragraph 7-167.

(1) Visually inspect leading and trailing edges of blade for nicks, dents, cracks, and burns.

(a) The maximum permissible finished repair depth is 0.062 inch from leading edge and 0.023 inch from trailing edge. Allowable depths decrease as distance between damage and point A (figure 7-36) on leading edge or point B on trailing edge decreases.

(b) No foreign object damage defects are allowed within 0.500 inch of blade platform.

(c) No cracks are allowed.

(2) Visually inspect blade surfaces for
dents, cracks, and burns.

(a) No foreign object damage defects
allowed within 0.500 inch of blade platform.

(b) No cracks are allowed.

(3) Visually inspect blade tip (shroud
cracks and scoring.

(a) No cracks are allowed.

(b) Tip rubs shall not exceed 0.030
depth.

(4) Visually inspect blade platform and
areas, and turbine disc for cracks. No
allowed.

(5) Visually inspect forward and aft
disc for rubs. Rubs 0.006 inch deep by 0.100
wide are acceptable, providing there is no
of extreme heat.

(6) Inspect aft side of disc for blades
below disc. If one or more blades are
than 0.025 inch, remove rotor assembly and
blades.

7-59. INSPECTION OF SECOND STAGE
TURBINE NOZZLE ASSEMBLY (T53-L-15/
Engines). (See figure 6-18.) Proceed as

ı. Visually inspect second stage power turbine nozle (11) for cracks. (See figures 7-37, 7-38, and 39.) Replace nozzle if any of the following limits e exceeded.

(1) Any number of 3/16 inch cracks are accept- e on trailing edge of vanes.

(2) Any number of 1/8 inch cracks are accept- e on leading edge of vanes.

(3) No inspection is required on shroud to vane azements (including overhang). Cracks are allowed.

CAUTION

When inspecting for circumferential cracks in following step (4), any evidence of turbine wheel rubbing on support is unacceptable regardless of circumferential crack length.

(4) Circumferential cracks at or adjacent to r shroud to support joint are acceptable provided cumulative crack length does not exceed onerter (90°) the circumference of the joint. (See fig- 7-37.)

(5) Circumferential cracks in the parent metal ner shroud between three adjacent vanes are itted (maximum of nine vanes). (See figure 7-

(6) A total of 15 axial cracks in the outer shroud t metal are allowed within the following limits. figure 7-39.)

(a) A maximum of five are allowed to be ted up to 3/4 inch.

(b) One crack is permitted which progresses the shroud leading edge, travels adjacent to , and terminates at cylinder radius.

(c) Any remaining cracks are allowed to be d up to 1/2 inch.

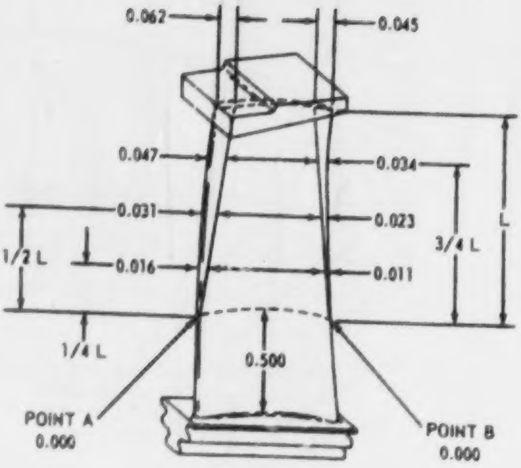
(7) Circumferential and/or converging cracks r shroud are not allowed. (See figure 7-38.)

(8) A maximum of ten cracks, which travel shroud trailing edge around vane brazements to g edge, are acceptable provided each crack is ted by at least two vanes. Each of these cracks wed to extend up to 1-1/4 inch into the support, ded no turbine rub is evident. (See figure 7-39.)

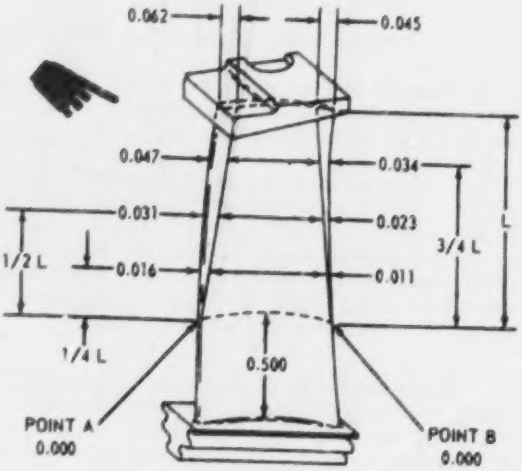
(9) (Deleted)

) Cracks in support/seal brazement are not ble.

Visually inspect second stage power turbine for rubs. Axial rubs resulting from contact bine rotor are not permitted.



FIRST STAGE POWER TURBINE BLADES



SECOND STAGE POWER TURBINE BLADES

ALL DIMENSIONS ARE IN INCHES

AV 062770
XA-654A

Figure 7-36. Maximum Repair Depth (T53-L-15/701)

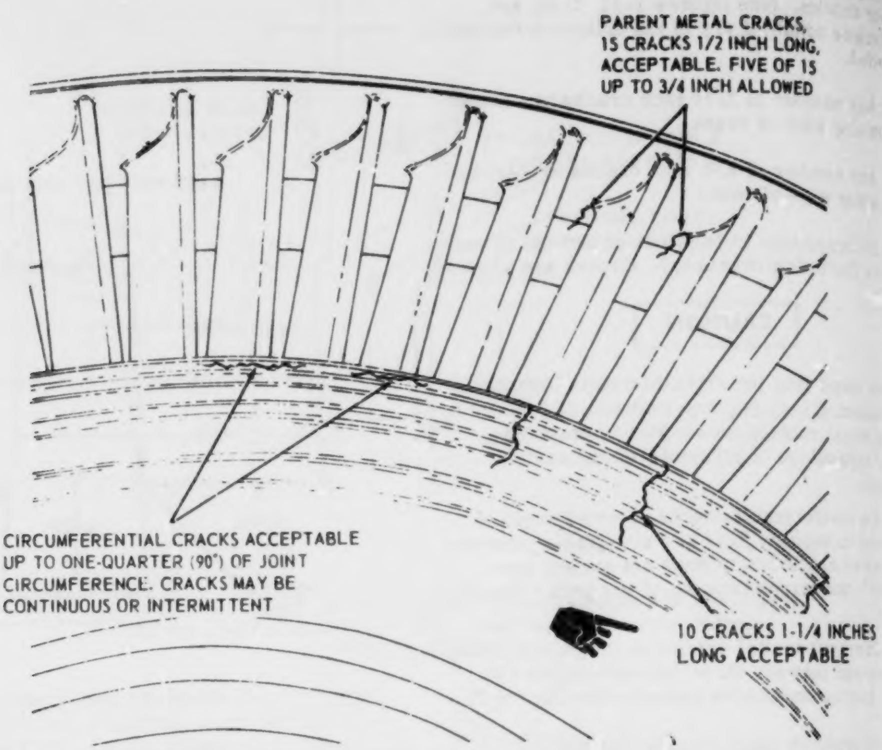

PARENT METAL CRACKS, 15 CRACKS 1/2 INCH LONG, ACCEPTABLE. FIVE OF 15 UP TO 3/4 INCH ALLOWED
CIRCUMFERENTIAL CRACKS ACCEPTABLE UP TO ONE-QUARTER (90°) OF JOINT CIRCUMFERENCE. CRACKS MAY BE CONTINUOUS OR INTERMITTENT
10 CRACKS 1-1/4 INCHES LONG ACCEPTABLE

Figure 7-37. Sealing Ring and Trailing Edge of Vanes - Inspection Limits (T53-L-15/701)

c. Visually inspect vanes for dents, nicks, and burrs. (See figure 7-40.) Blend repair nicks, dents, and burrs as outlined in paragraph 7-136.

(1) A maximum of four nicks or dents are allowed on vane leading edge, provided that after blend repair, depth of any defect does not exceed 3/32 inch and length does not exceed 3/16 inch. Separation of defects shall be at least twice the length of the shortest defect after blend repair. Smooth dents within limits are acceptable without blend repair.

(2) A maximum of four nicks or dents are allowed on vane trailing edge, provided that after blend repair, depth of any defect does not exceed 3/32 inch and length does not exceed 3/16 inch. Separation of defects shall be at least twice the length of the shortest defect after blend repair. Smooth dents within limits are acceptable without blend repair.

(3) Minor nicks and dents on vane airfoil surfaces are acceptable on all vanes. Blend repair to remove nicks.

(4) Burrs are acceptable on vane leading and trailing edges. Blend repair to remove burrs.

d. Visually inspect nozzle for burns. Burns in leading and trailing edges of vanes are not allowed.

7-60. INSPECTION OF COMBUSTION CHAMB
HOUSING ASSEMBLY (T53-L-15/701 Engines).
figure 6-19.) Proceed as follows:

a. Inspect combustion chamber housing ass
(7) for nicks, burrs, and scratches. Blend-repa
nick, burrs, and scratches as outlined in parag
7-136.

b. Inspect housing assembly for damaged thr
Repair damaged threads as outlined in paragrap
138. If threads are damaged beyond repair, rep
housing assembly.

c. Inspect housing assembly for missing or d
aged liner supports. Replace missing or damag
liner supports as outlined in paragraph 7-184.

d. Visually inspect housing assembly for cr
and distortion. Replace housing if cracks are
Replace housing if distorted beyond repair.

7-61. INSPECTION OF COMBUSTION CHAM
LINER ASSEMBLY (T53-L-15/701 Engines).
figures 6-19 and 7-41.) Proceed as follows:

a. Visually inspect combustion chamber lin
figure 6-19) for cracks. Replace liner if crac
ceed the following limits.

(1) Any number of 1/8 inch long cracks a
lowed in liner at conical-section louvers.

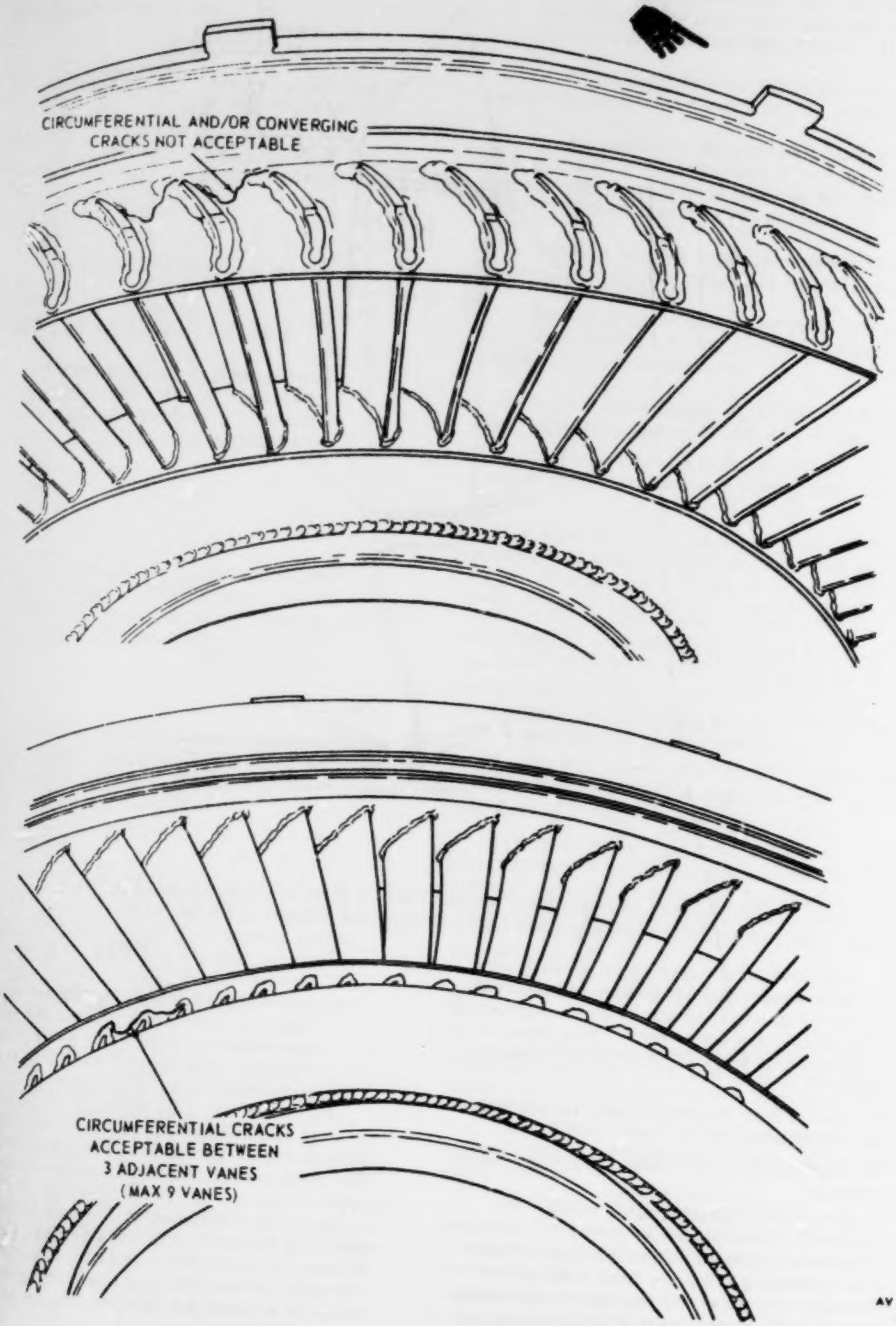

CIRCUMFERENTIAL AND/OR CONVERGING CRACKS NOT ACCEPTABLE
CIRCUMFERENTIAL CRACKS ACCEPTABLE BETWEEN 3 ADJACENT VANES (MAX 9 VANES)
AV 082771
X-854A

Figure 7-38. Second Stage Power Turbine Nozzle - Inspection Limits for Inner and Outer Shroud Brazements (T53-L-15/701)

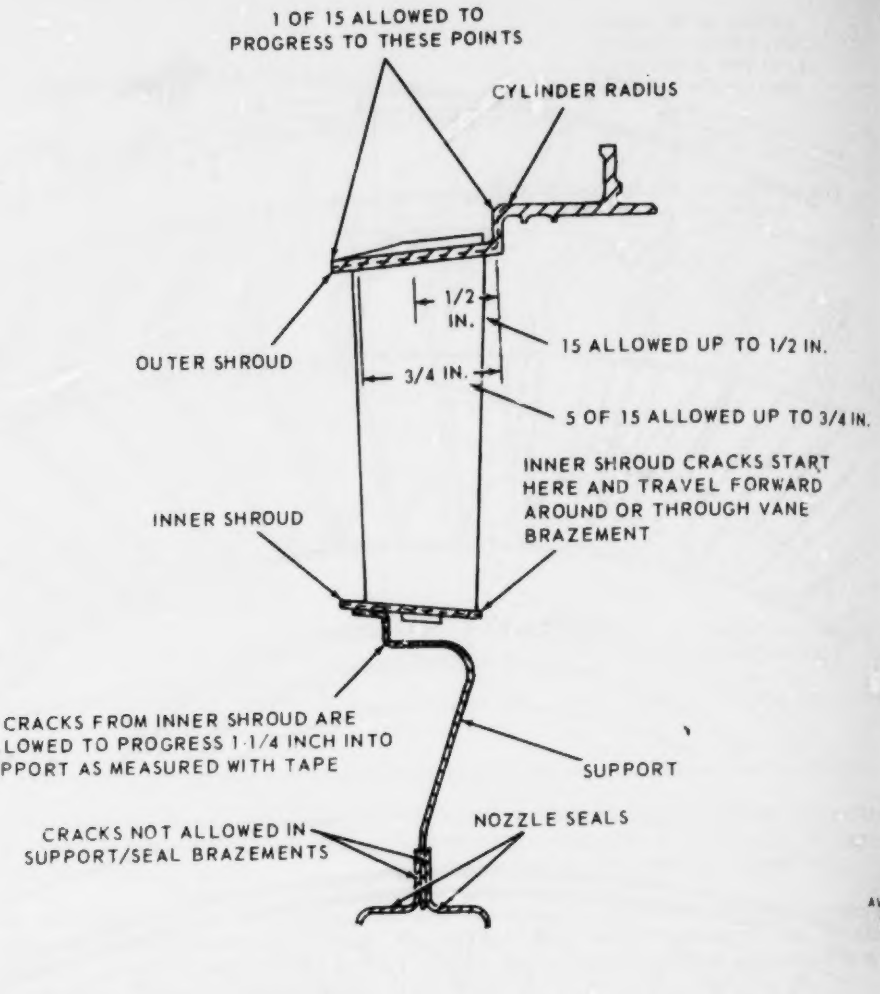

1 OF 15 ALLOWED TO PROGRESS TO THESE POINTS
CYLINDER RADIUS
1/2 IN.
15 ALLOWED UP TO 1/2 IN.
OUTER SHROUD
3/4 IN.
5 OF 15 ALLOWED UP TO 3/4 IN.
INNER SHROUD CRACKS START HERE AND TRAVEL FORWARD AROUND OR THROUGH VANE BRAZEMENT
INNER SHROUD
10 CRACKS FROM INNER SHROUD ARE ALLOWED TO PROGRESS 1-1/4 INCH INTO SUPPORT AS MEASURED WITH TAPE
SUPPORT
NOZZLE SEALS
CRACKS NOT ALLOWED IN SUPPORT/SEAL BRAZEMENTS

Figure 7-39. Second Stage Power Turbine Nozzle - Inspection Limits for Cracks in Inner and Outer Shroud and Support (T53-L-15/701)

(2) Any number of cracks progressing from nozzle holes to louvers in end liner are acceptable, provided louver to louver cracks which could result in material fallout are not present. (See figure 7-42.) Cracks extending up to or adjacent to air holes are acceptable.

(3) One of four weldments may be cracked on each fuel nozzle seal guide.

(4) Damage limits for inner and outer liners are as follows.

CAUTION

When cracks appear in the inner liner tab area emanating from the base of adjacent sawcuts, only axial and nonconvergent cracks are allowed. Reject liner if circumferential or convergent cracks are present. Circumferential or convergent cracks may result in material fallout.

NOTE

A total of five cracks up to one inch in length on both inner and outer liners are acceptable provided cracks are nonconvergent, tight-lipped, and there is no possibility of material fallout.

(a) Cracks between two holes are acc without repair except in areas shown in figure Ten nonadjacent cracks per assembly are allo

(b) Cracks up to 3/4 inch in length o nating at the base of the sawcuts are acceptab all sawcuts provided cracks that emanate from two adjacent sawcuts are nonconvergent. Only crack is allowed per sawcut. Do not stop-drill cracks.

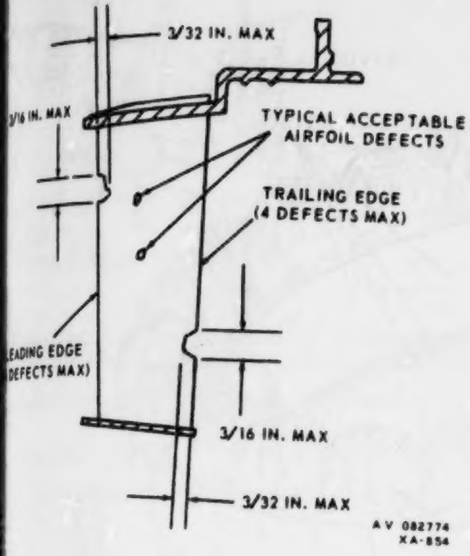


Figure 7-40. Second Stage Power Turbine Nozzle - Inspection and Repair Limits for Nicks and Dents on Vane Leading and Trailing Edges (T53-L-15/701)

(c) Cracks in a total of 30 resistance welds acceptable without repair in each liner-to-liner er-to-flange weldment, provided no more than adjacent welds are affected.

(d) (Deleted)

CAUTION

Burning, distortion or uneven carbon buildup is an indication of malfunction or clogging of fuel system components. Investigate and replace malfunctioning or clogged components.

NOTE

Burned areas indicated by metal discoloration are acceptable, provided buckling is not evident.

(e) Burn-through shall not exceed 3/4 square r assembly. Replace liner if burn-through exspecified limit or crack progression will cause al fallout.

CAUTION

Missing tabs could cause improper sealing between the inner liner and mating N1 nozzle with resultant downstream damage.

(f) Missing tabs on liners are not acceptable. Replace liner if one or more tabs is missing.

(g) Moderate warpage or buckling is acceptable, provided no interference of mating parts occurs. Replace liner assembly if buckling and distortion exceed 0.100 inch from original profile.

b. Visually inspect inner liner dimples for wear. Wear-through on any number of dimples is permitted.

c. Inspect liner brackets and studs for wear. Replace liner bracket or stud if wear exceeds one-quarter of original thickness.

d. Inspect for clogging of air gaps and holes. Reclean liner assembly if air gaps or holes are clogged.

e. Air gap shall be as shown in figure 7-43, sheets 1 and 2. Adjust air gap as required using suitable prying tool.

f. Inspect studs for damaged threads. Repair damaged threads on studs as outlined in paragraph 7-138. If threads are damaged beyond repair, replace studs as outlined in paragraph 7-165.

g. Inspect seal guides for wear, missing tabs, and other damage. One tab missing from each seal guide is acceptable. Replace seal guide(s) if worn or damaged or more than one tab is missing. (Refer to paragraph 7-165.)

7-62. INSPECTION OF EXHAUST DIFFUSER ASSEMBLY (T53-L-15/701 Engines). (See figure 6-18 and 7-43.) Proceed as follows:

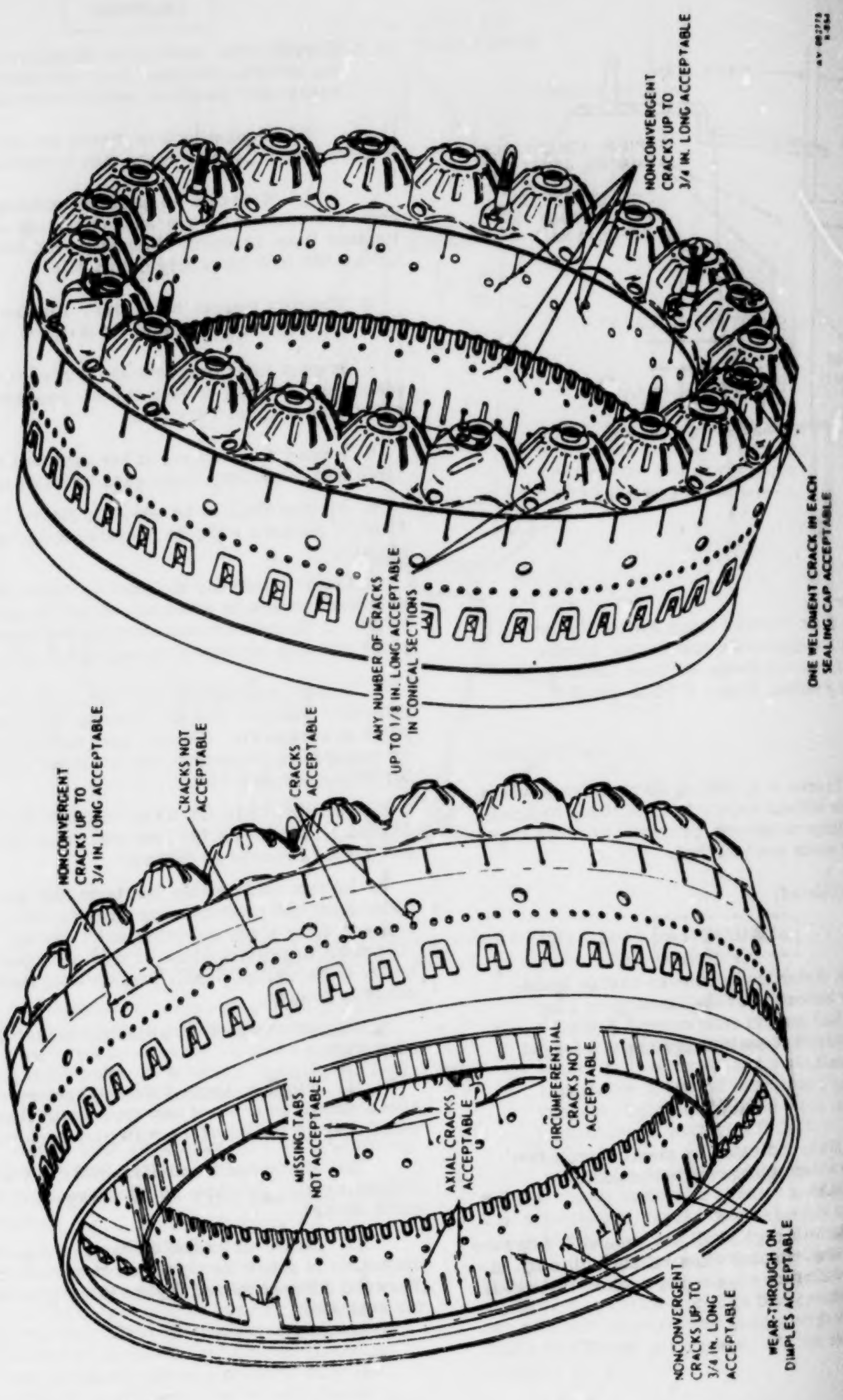
a. Inspect outer struts for dents that can deform outer strut and produce a gap greater than 1/16 inch between outer strut and outer strut fairing. Using a 10-power magnifying glass or dye-penetrant method (refer to paragraph 7-29), inspect such dents for possible cracks.

b. Visually inspect all areas for nicks, dents, and distortion.

(1) Nicks are acceptable without repair in all areas except inner strut and inner strut flange, provided they do not interfere with part performance.

(2) Minor dents and distortions are acceptable without repair, provided no interference of mating parts occurs.

(3) Major distortion or damage associated with distortion is cause for rejection of exhaust diffuser. Forward diffuser to next higher maintenance category for evaluation.


NONCONVERGENT CRACKS UP TO 3/4 IN. LONG ACCEPTABLE
ONE WELDMENT CRACK IN EACH SEALING CAP ACCEPTABLE
ANY NUMBER OF CRACKS UP TO 1/8 IN. LONG ACCEPTABLE IN CONICAL SECTIONS
NONCONVERGENT CRACKS UP TO 3/4 IN. LONG ACCEPTABLE
CRACKS NOT ACCEPTABLE
CRACKS ACCEPTABLE
MISSING TABS NOT ACCEPTABLE
AXIAL CRACKS ACCEPTABLE
CIRCUMFERENTIAL CRACKS NOT ACCEPTABLE
NONCONVERGENT CRACKS UP TO 3/4 IN. LONG ACCEPTABLE
WEAR-THROUGH ON DIMPLES ACCEPTABLE

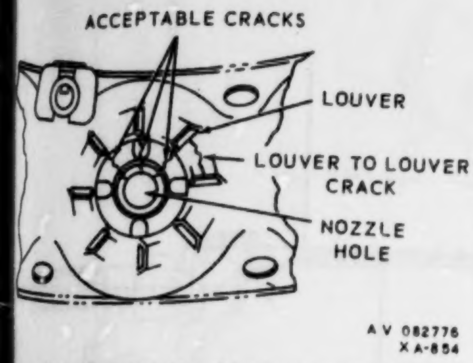


Figure 7-42. Inspection Limits for Combustion Chamber Liner Nozzle Hole (T53-L-15/701)

, Inspect outer cone for cracks. No cracks al-
d.

, (Deleted)

, Inspect mid and inner cones for cracks and
ng.

(1) Any number of tight-lipped, nonconvergent
s up to 1/2 inch in length, which do not affect
nent, are acceptable without repair. Circumfer-
l cracks adjacent to mounting flange are not
itted.

(2) No burn-throughs are permitted. Replace
er.

Inspect bearing housing support for cracks.
ight-lipped, nonconvergent cracks up to 1/2
n length, which do not affect weldments, are
table without repair.

Inspect outer strut and outer strut fairing for
, dents, cracks, and burning as follows and re-
s outlined in paragraph 7-136.

(1) Repair nicks and dents which could prevent
sion movement of strut and fairing.

(2) All nonconverging cracks on the outer strut
g are acceptable without repair provided they do
tend into the spot welded area at the base of the
.

(3) One crack per stut fairing is allowed up to
inches in length without repair. If limits are
ed, replace exhaust diffuser.

(4) No burn-throughs are permitted. Replace
r.

(5) Any number of tight-lipped nonconvergent
in the outer strut, not exceeding 1/2 inch in
are acceptable without repair, provided weld-
are not affected.

) Replace exhaust diffuser if crack limits are
d.

h. Inspect inner strut flange for cracks. Two cracks, 1/2 inch in length, are acceptable without repair on each inner strut outer flange.

i. Inspect flange of inner strut for cracks. No cracks are allowed.

j. Inspect mounting flange for damaged or missing nuts (1-300-086-01).

k. Check diffuser for distortion and concentricity as follows, and replace diffuser if limits are exceeded.

(1) Using a suitable faceplate or engine lathe, check mounting bolt hole flange for flatness of 0.002 inch TIR.

(2) Check that surface of rear flange is parallel to mounting flange within 0.002 inch TIR.

l. Inspect exhaust thermocouple mounting studs for damage or stripped threads. Replace as instructed in paragraph 7-166.

7-63. INSPECTION OF POWER TURBINE ROTOR AND BEARING HOUSING ASSEMBLY (T53-L-15/701 Engines). (See figure 6-20.) Proceed as follows:

a. Using clean dry air, inspect oil passages in ring assembly (16), retaining ring (24), and bearing housing (27) for clogging. Reclean parts if oil passages are clogged.

b. Inspect seal (34, figure 6-18 and 12, figure 6-20) for cuts, nicks, tears, cracks, distortion, pliability, and wear. If damage is noted, replace seal.

c. Using 7-power magnifying glass, inspect power turbine rotor as follows:

(1) Visually inspect blade leading and trailing edges for nicks, dents, cracks, and burns as follows and repair as outlined in paragraph 7-136.

(a) Maximum permissible finish repair depth is 0.047 inch from leading edge and 0.034 inch from trailing edge. Allowable depths decrease as distance between damage and point A (figure 7-36) on leading edge or point B on trailing edge decreases.

(b) No cracks are allowed.

(c) No burns allowed.

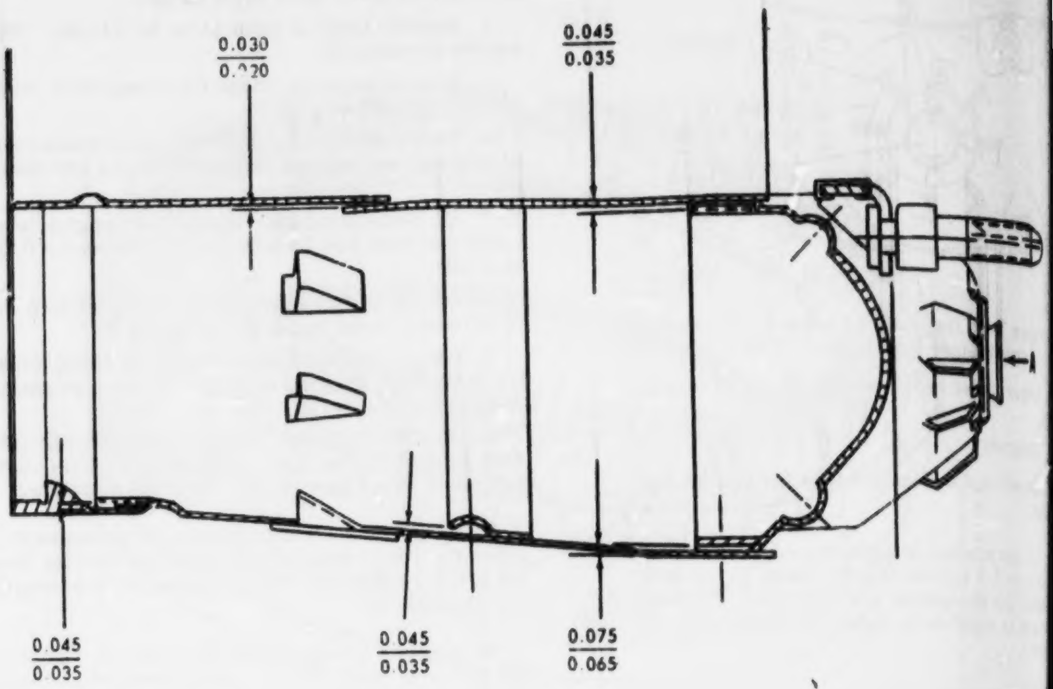
(d) No dents are allowed within 0.500 inch from blade platform.

(2) Visually inspect blade surface for nicks, dents, cracks, and burns as follows and repair as outlined in paragraph 7-167.

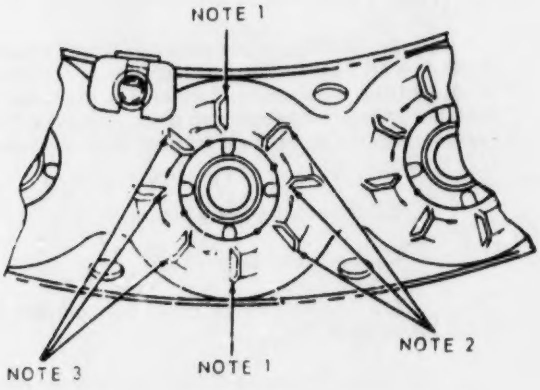
(a) No dents are allowed within 0.500 inch of blade platform.

(b) No burns or cracks are allowed.

(3) Visually inspect blade tip (shroud end) for cracks and scoring.


0.030
0.020
0.045
0.035
A
0.045
0.035
0.045
0.035
0.075
0.065

ALL DIMENSIONS ARE IN INCHES


NOTE 1
NOTE 2
NOTE 3
NOTE 1

VIEW A

NOTES	AIR GAP (TYPICAL 18 PLACES)
1	0.075
2	0.050
3	0.100

Figure 7-43. Combustion Chamber Liner - Air Gap Dimension (T53-L-15/701) (Sheet 1 of 2)

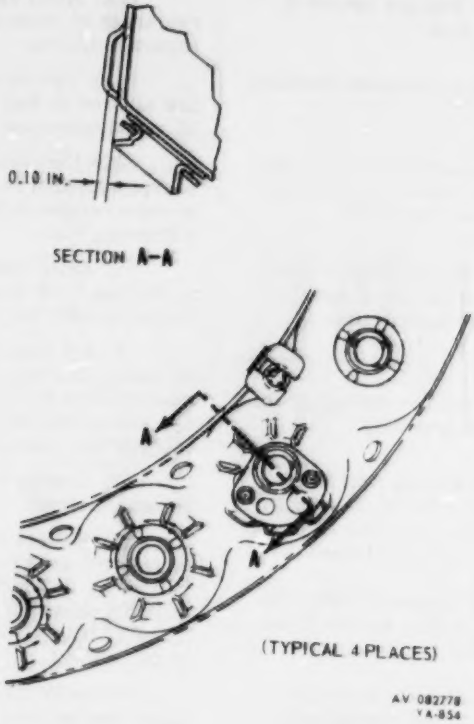


Figure 7-43. Combustion Chamber Liner - Air Gap Dimension (T53-L-15/701) (Sheet 2 of 2)

(a) Cracks are cause for rotor replacement.

(b) Tip rubs shall not exceed 0.030 inch

(4) Visually inspect blade platform and root areas, urbine disc for cracks. No cracks allowed.

Visually inspect turbine impellers (13 and 21, e 6-20) for loss of protective surface finish.

(1) This condition is acceptable to any degree loose particles of coating are removed by abrading with crocus cloth (item 23, table

CAUTION

Ensure that turbine bearing housing area is free of all contaminants prior to reassembly. If inspection in following step (2) reveals coating loss or main oil filter exhibits contamination, flush engine. (Refer to paragraph 4-6.)

(2) Impellers which are galled or deeply into parent metal shall be replaced.

Inspect forward and aft face of disc for corro- tting. Pitting up to a maximum depth of 0.015 permitted.

Visually inspect forward and aft face of disc for Rubs 0.006 inch deep by 0.100 inch wide are acceptable, providing there is no indication of extreme heat (discoloration).

f. Visually inspect aft side of rotor disc for blades recessed below disc. If one or more blades is recessed more than 0.025 inch, remove disc and reseat blades. (Refer to paragraph 7-167.)

7-64. INSPECTION OF SECOND STAGE GAS PRODUCER TURBINE ROTOR ASSEMBLY AND SPACER (T53-L-15/701 Engines). (See figure 3-28.) Proceed as follows:

NOTE

If both first and second stage gas producer turbine rotors are to be replaced, new rotors shall be initially installed with the yellow "H" markings (if present) which denote the heavy balance point, 180 degrees apart.

a. Inspect turbine rotor blades for nicks and dents. Nicks up to 0.010 inch in depth are acceptable. Dents are acceptable if blade is not distorted. Replace rotor if depth of nicks exceeds 0.010 inch.

b. Inspect turbine rotor blades and disc for cracks. Cracks are not allowed.

c. Inspect turbine rotor blades for tip rubs. Tip rubs up to 0.030 inch deep are acceptable.

d. Inspect spacer for scoring. Replace spacer if scoring exceeds a depth of 0.022 inch.

e. Inspect spacer for cracks or distortion. Replace spacer if cracked or distorted.

f. Inspect for rubs on forward and aft face of disc. Rubs 0.006 inch deep by 0.100 inch wide are allowed, provided no indications of extreme heat exist.

g. Inspect aft side of disc for blades recessed below disc. If one or more blades is recessed more than 0.025 inch, remove disc and reseat blades as outlined in paragraph 7-168.

h. Inspect disc for fretting in spacer contact area. Fretting is acceptable up to 0.005 inch deep.

7-65. INSPECTION OF SECOND STAGE GAS PRODUCER CYLINDER AND SECOND STAGE GAS PRODUCER NOZZLE ASSEMBLY (T53-L-15/701 Engines). (See figures 3-28 and 7-44.) Proceed as follows:

a. Inspect second stage gas producer cylinder (51, figure 3-28, sheet 2) for cracks. Radial cracks from bolt holes to outer edge of cylinder are acceptable.

b. Visually inspect second stage turbine nozzle assembly (38, figure 3-28, sheet 2) for cracks and replace assembly if inspection limits are exceeded.

(1) Any number of 1/8 inch, nonconverging cracks are acceptable on trailing edge of vanes. (See figure 7-44, sheets 1 and 2.)

(2) Any number of 1/16 inch cracks are acceptable on leading edge of vanes. Any number of 1/8 inch cracks are acceptable on a maximum of 15 vanes.

(3) No inspection is required of vane-to-shroud brazements. Cracks are acceptable.

(4) A maximum of 40 axial cracks are allowed in any combination emanating from vane leading and trailing edges and extending into parent metal of outer shroud, provided cracks do not exceed 5/16 inch.

NOTE

When measuring cracks in outer shroud that break out from brazements, measure only parent metal portion of cracks.

(4A) Axial vane-to-vane cracks are allowed two areas of outer shroud, provided 10 vanes mi separate cracks.

(4B) Two circumferential vane-to-vane cr are allowed in four areas of outer shroud, provid 10 vanes minimum separate cracks.

(4C) Circumferential converging cracks ar acceptable, provided limits for circumferential v to-vane cracks outlined in step (4B) have not rea maximum limit.

(5) Axial cracks in parent metal of outer s emanating from vane trailing edge into seal ring are acceptable on two nonadjacent vanes.

(6) Six cracks through inner shroud (inclu around or through vane brazement) and extending maximum of 1-1/2 inch into forward and aft sup are acceptable on the same vane, provided a mi mum of five vanes separate the defects.

(7) Cracks or severe mutilation are not all on nozzle tangs.

(8) Inspect forward support to inner shroud brazement area for cracks with accompanying se ration. Up to 3 inches of cumulative cracking is a ceptable provided joint is not widely separated (greater than 1/32 inch) and distortion and/or r is not evident.

c. Visually inspect nozzle tangs for bending. tangs may be cold straightened. Inspect area for cracks by dye-penetrant method after straighten Replace nozzle if cracks are evident.

d. Visually inspect nozzle tangs for nicks, bu or rolled-over effect on edges. Blend-repair as lined in paragraph 7-136.

e. Visually inspect vanes for burns and repla nozzle if inspection limits are exceeded.

(1) Burns on leading edge 1/16 by 3/8 inch on maximum of 10 vanes are allowed.

(2) Burns on trailing edge 1/8 by 1/4 inch maximum of 10 vanes are allowed.

f. Check wall thickness of second stage gas ducer cylinder flange at points indicated for rew (Refer to paragraph 3-52.) If thickness is less t that shown in figure 7-45, or if removal of mate necessary to obtain required tip clearance will crease wall thickness to less than that shown, r cylinder. If wall thickness is sufficient for rew skim cylinder as outlined in paragraph 7-170.

g. Visually inspect vanes for dents, nicks, a burrs. (See figure 7-46.) Blend-repair as outli in paragraph 7-136.

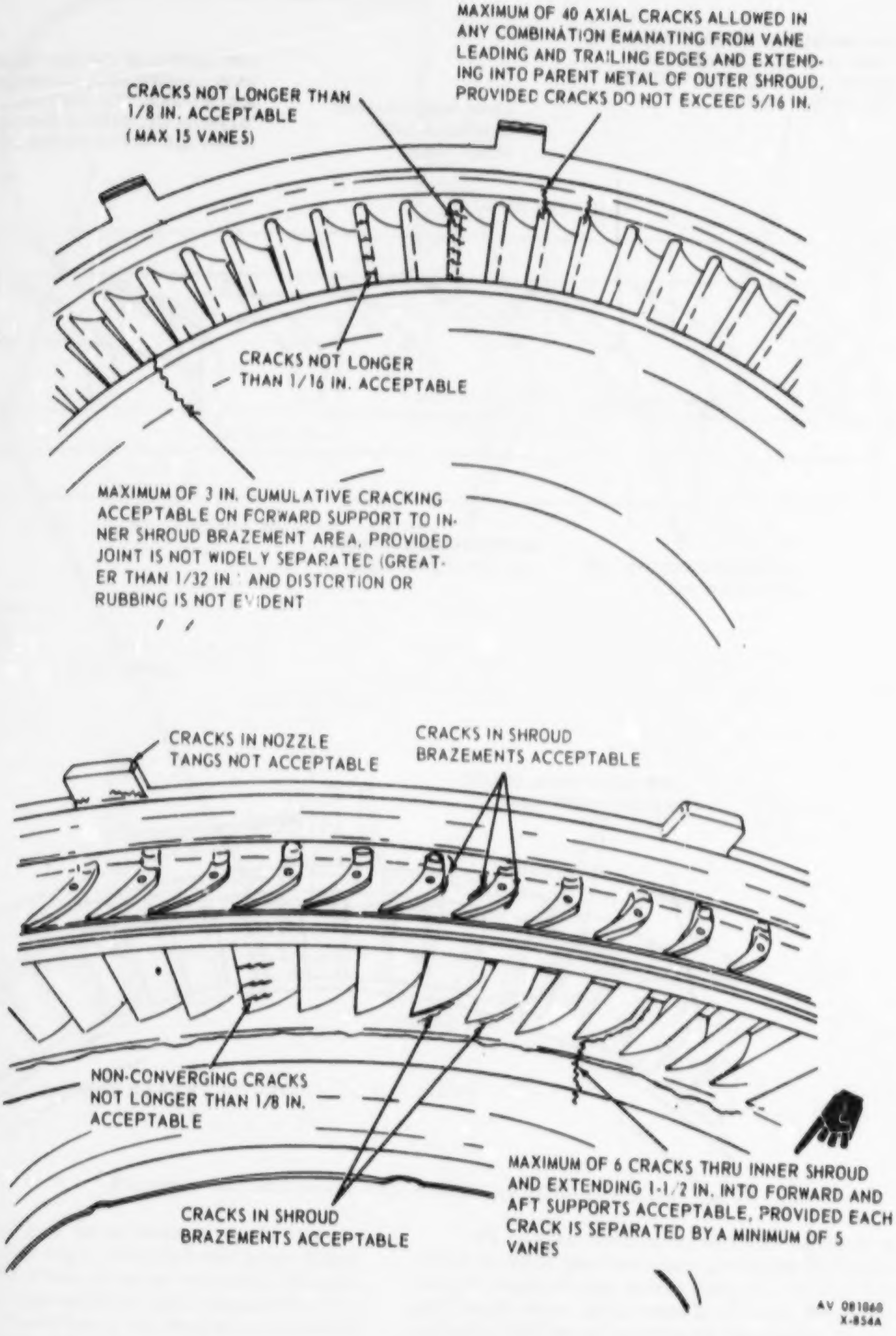

MAXIMUM OF 40 AXIAL CRACKS ALLOWED IN ANY COMBINATION EMANATING FROM VANE LEADING AND TRAILING EDGES AND EXTENDING INTO PARENT METAL OF OUTER SHROUD, PROVIDED CRACKS DO NOT EXCEED 5/16 IN.
CRACKS NOT LONGER THAN 1/8 IN. ACCEPTABLE (MAX 15 VANES)
CRACKS NOT LONGER THAN 1/16 IN. ACCEPTABLE
MAXIMUM OF 3 IN. CUMULATIVE CRACKING ACCEPTABLE ON FORWARD SUPPORT TO INNER SHROUD BRAZEMENT AREA, PROVIDED JOINT IS NOT WIDELY SEPARATED (GREATER THAN 1/32 IN.) AND DISTORTION OR RUBBING IS NOT EVIDENT
CRACKS IN NOZZLE TANGS NOT ACCEPTABLE
CRACKS IN SHROUD BRAZEMENTS ACCEPTABLE
NON-CONVERGING CRACKS NOT LONGER THAN 1/8 IN. ACCEPTABLE
MAXIMUM OF 6 CRACKS THRU INNER SHROUD AND EXTENDING 1-1/2 IN. INTO FORWARD AND AFT SUPPORTS ACCEPTABLE, PROVIDED EACH CRACK IS SEPARATED BY A MINIMUM OF 5 VANES
CRACKS IN SHROUD BRAZEMENTS ACCEPTABLE
AV 081060
X-854A

Figure 7-44. Second Stage Turbine Nozzle Assembly - Inspection Limits for Leading and Trailing Edges of Vanes, and Inner and Outer Shroud (T53-L-15/701) (Sheet 1 of 2)

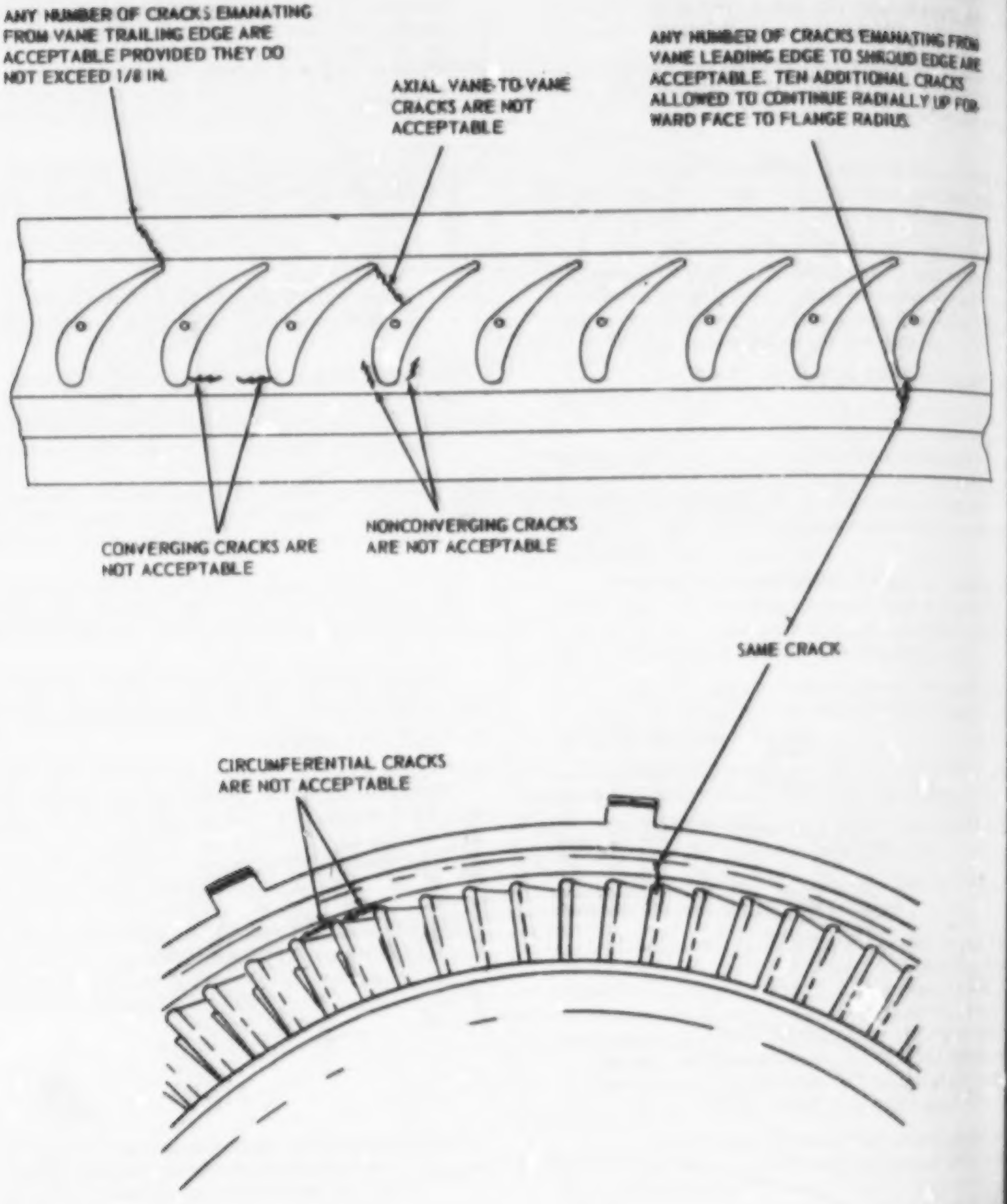
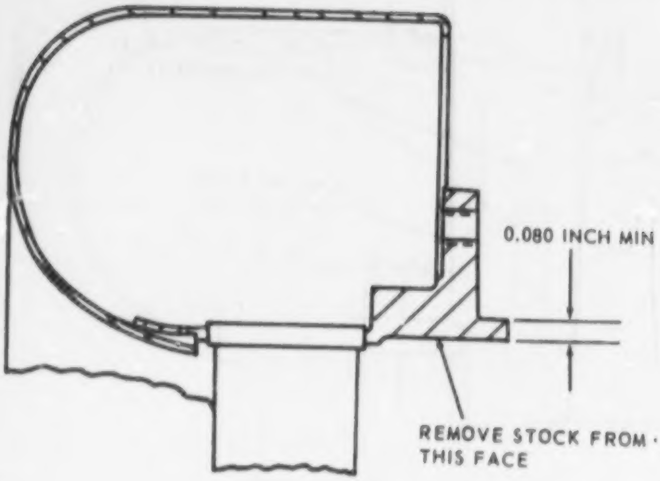
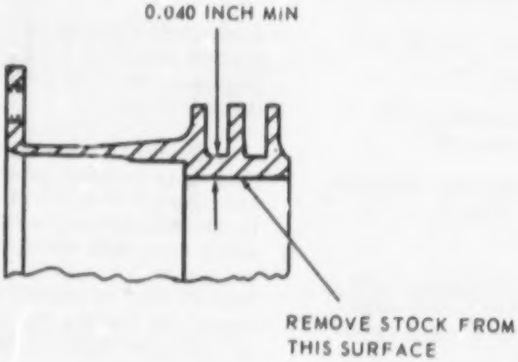

ANY NUMBER OF CRACKS EMANATING FROM VANE TRAILING EDGE ARE ACCEPTABLE PROVIDED THEY DO NOT EXCEED 1/8 IN.
AXIAL VANE-TO-VANE CRACKS ARE NOT ACCEPTABLE
ANY NUMBER OF CRACKS EMANATING FROM VANE LEADING EDGE TO SHROUD EDGE ARE ACCEPTABLE. TEN ADDITIONAL CRACKS ALLOWED TO CONTINUE RADIALLY UP FORWARD FACE TO FLANGE RADIUS.
CONVERGING CRACKS ARE NOT ACCEPTABLE
NONCONVERGING CRACKS ARE NOT ACCEPTABLE
SAME CRACK
CIRCUMFERENTIAL CRACKS ARE NOT ACCEPTABLE

Figure 7-44. Second Stage Turbine Nozzle Assembly - Inspection Limits for Leading and Trailing Edges of Vanes, and Inner and Outer Shroud (T53-L-15/701) (Sheet 2 of 2)



FIRST STAGE TURBINE NOZZLE ASSEMBLY



SECOND STAGE GAS PRODUCER CYLINDER

AV 082782
XA-854A

Figure 7-45. Minimum Wall Thickness (T53-L-15/701)

(1) A maximum of three nicks or dents are al- d on vane leading edge, provided that after blend r, depth of any defect does not exceed 1/16 inch ngth does not exceed 3/32 inch. Separation of ts shall be at least twice the length of the short- efect after blend repair. Smooth dents within s are acceptable without blend repair.

(2) A maximum of three nicks or dents are allowed on vane trailing edge, provided that after blend repair, depth of any defect does not exceed 3/32 inch and length does not exceed 3/16 inch. Separation of defects shall be at least twice the length of the shortest defect after blend repair. Smooth dents within limits are acceptable without blend repair.

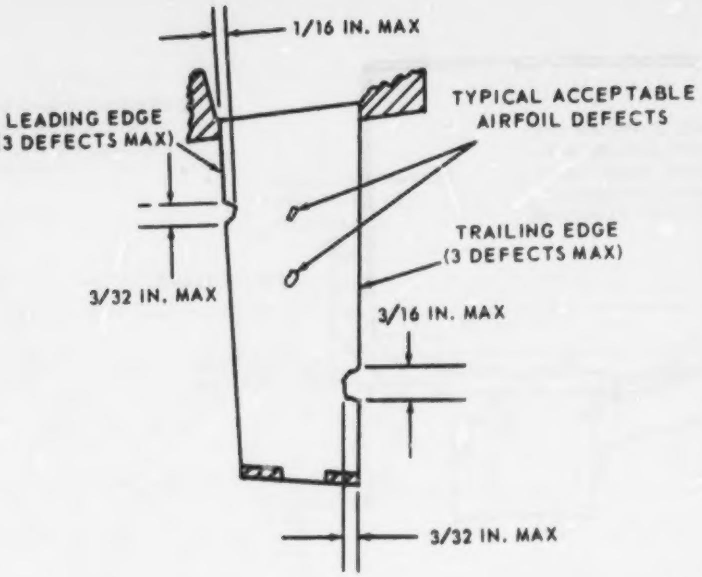


Figure 7-46. Second Stage Turbine Nozzle Assembly - Inspection and Repair Limits for Nicks and Dents on Vane Leading and Trailing Edges (T53-L-15/701)

(3) Nicks and dents on vane airfoil surfaces are acceptable on all vanes. Blend repair to remove nicks.

(4) Burrs are acceptable on vane leading and trailing edges. Blend repair to remove burrs.

h. Visually inspect inner shroud for axial and circumferential rubs. Rubs are not allowed.

7-66. INSPECTION OF FIRST STAGE GAS PRODUCER TURBINE ROTOR ASSEMBLY (T53-L-15/701 Engines). Proceed as follows:

a. Inspect turbine rotor blades (32, figure 3-28) for nicks and dents. Nicks up to 0.010 inch in depth are acceptable. Dents are acceptable if blade is not distorted.

b. Inspect turbine rotor blades and disc for cracks. Cracks are not allowed.

c. Inspect for rubs on forward and aft face of disc. Rubs 0.006 inch deep by 0.100 inch wide are allowed, provided no indications of extreme heat are evident.

d. Inspect disc for evidence of fretting. Fretting in spacer contact area up to 0.005 inch deep is acceptable.

7-67. INSPECTION OF OIL RING AND SEALING RING (T53-L-15/701 Engines). Proceed as follows:

a. Inspect oil ring (24, figure 3-28) for nicks, burrs, or loss of plating.

b. Inspect sealing ring flange (28) for cracks, warpage, or out-of-roundness.

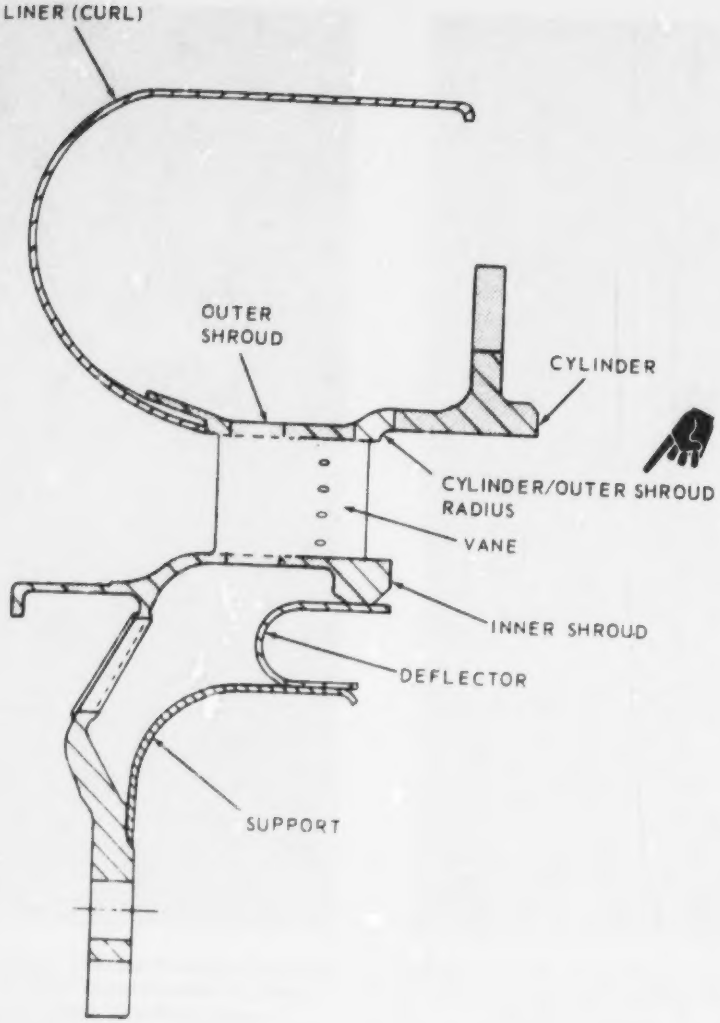
7-68. INSPECTION OF FIRST STAGE GAS PRODUCER NOZZLE ASSEMBLY (T53-L-15/701 Engines). Proceed as follows: (See figures 7-4 through 7-52.)

a. Inspect nozzle assembly (12, figure 3-28) defects as listed in table 7-6. For inspection lo see figure 7-46A. First stage turbine nozzle as (1-110-520-19) may exhibit areas of vane traili which have been blend-repaired and nozzle coati applied by the manufacturer (see figure 7-47). T repairs have no significant effect on engine perf Inspection limits given in table 7-6 shall be app only to those defects caused by engine operatio

b. Perform fluorescent-penetrant inspection first stage gas producer nozzle assembly (12, f 3-28) as outlined in paragraph 7-31. Inspect for cracks in curl OD.

c. Check wall thickness of first stage gas pr er nozzle cylinder flange at points indicated for work. (Refer to paragraph 3-52.) Replace with zle 1-110-520-19 or 1-110-520-21 if thickness than that shown in figure 7-45 or if removal of al necessary to obtain required tip clearance w crease wall thickness to less than that shown in ure 7-45.

d. Skim nozzle cylinder flange if wall thick sufficient for rework. (Refer to paragraph 7-1


LINER (CURL)
OUTER SHROUD
CYLINDER
CYLINDER/OUTER SHROUD RADIUS
VANE
INNER SHROUD
DEFLECTOR
SUPPORT

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XA-854A

Figure 7-46A. First Stage Turbine Nozzle Assembly (T53-L-15/701)

0. INSPECTION OF COMBUSTION CHAMBER FLECTOR (T53-L-15/701 Engines). (See figure 3.) Proceed as follows:

. Visually inspect for circumferential cracks at n weld of support to deflector (1, figure 7-53). cks totaling 180 degrees or less are acceptable.

b. Inspect support for circumferential cracks (2). Cracks totaling 90 degrees or less are acceptable.

c. Inspect for cracks in bolt hole circle (3). Cracks emanating from bolt holes to the center of the deflector are acceptable.

d. Repair cracks in the support (bolt hole ring and surrounding parent metal) by fusion welding, using welding wire shown in paragraph 7-171.

-47. First Stage Turbine Nozzle Assembly
-530-19) - Typical Manufacturer's Blend
pair Areas on Vane Trailing Edges
(T53-L-15/701) (Sheet 1 of 2)

ct outer flange for cracks starting from
d progessing forward through the seam
t axial cracks to 3/4-inch length, as
from flange forward edge, are acceptable.
ntial cracking is not allowed. Repair
t exceed limits by fusion welding (refer
h 7-139), using welding alloy wire (item
2-2).

ECTION OF REAR COMPRESSOR BEAR-
AL RETAINER, AFT SEAL, REAR BEAR-
G ASSEMBLY, ROLLER BEARING, FOR-
ING, AND FORWARD SEAL (T53-L-15/
.) Proceed as follows:

NOTE

rd seal 1-300-173-01 (1, figure 3-28,
1) is manufactured with a fracture at
f the slot locations on the air side of
rbon element. This fracture is not a
t and is not considered cause for seal

Figure 7-47. First Stage Turbine Nozzle Assembly (1-110-520-19) - Typical Manufacturer's Blend Repair Areas on Vane Trailing Edges (T53-L-15/701) (Sheet 2 of 2)

replacement. Forward seals 1-300-173-02 and 1-300-173-04 (1, figure 3-28, sheet 1) and aft seals 1-300-174-02 and 1-300-174-03) (26, figure 3-28, sheet 1) are manufactured with three splits, 120 degrees apart, on the air side of the carbon element. These splits are not defects and should not be considered cause for seal replacement.

a. Inspect all parts for nicks, burrs, and scratches. Blend-repair as outlined in paragraph 7-136.

b. Inspect rear bearing housing assembly (7, figure 3-28) for damaged threads. Repair minor thread damage as outlined in paragraph 7-138. Replace housing assembly if threads are damaged beyond repair.

c. Visually inspect all parts for cracks, distortion, and excessive wear. Replace all cracked, distorted, or excessively worn parts.

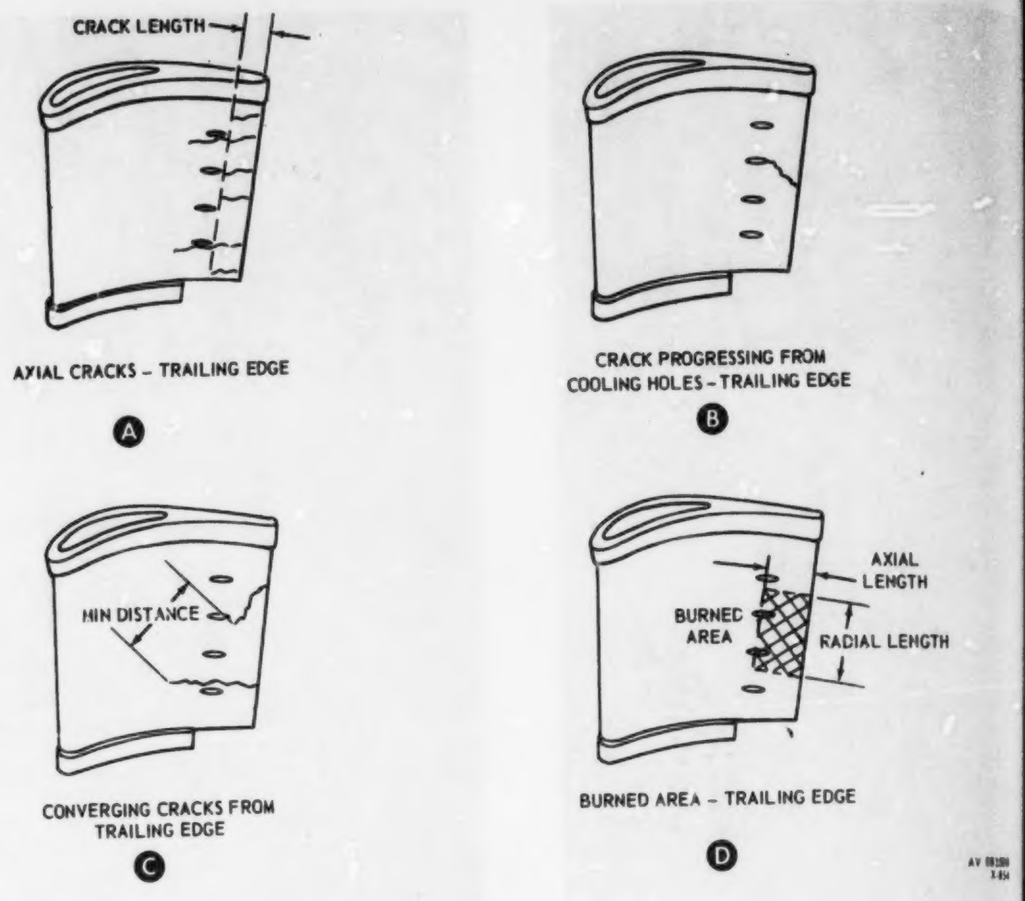

CRACK LENGTH
AXIAL CRACKS - TRAILING EDGE
A
CRACK PROGRESSING FROM COOLING HOLES - TRAILING EDGE
B
MIN DISTANCE
CONVERGING CRACKS FROM TRAILING EDGE
C
AXIAL LENGTH
BURNED AREA
RADIAL LENGTH
BURNED AREA - TRAILING EDGE
D
AV 081380 1-814

Figure 7-48. First Stage Gas Producer Nozzle - Vane Trailing Edge Inspection Areas (T53-L-15/701)

d. Inspect retaining plate (22, figure 3-28) for restricted oil passages. Clear oil passages using suitable drill rod.

e. Inspect aft seal (26) for damage. Replace damaged aft seal as outlined in paragraph 7-172.

7-71. INSPECTION OF REDUCTION GEAR ASSEMBLY, SUN GEARSHAFT, TORQUEMETER VALVE, CYLINDER, AND PROPELLER SHAFT (T53-L-7/7A/15 Engines). Proceed as follows:

a. Perform magnetic-particle inspection on parts listed in table 7-3. (Refer to paragraph 7-30.)

b. For T53-L-7/7A engines, perform fluorescent-penetrant inspection as outlined in paragraph 7-31.

NOTE

In each case where the surface condition of the gear is found to be unacceptable, forward the reduction gear assembly to the next higher category for disposition.

c. Using a 3-power magnifying glass, visually i spect sun gearshaft, planet gearshafts, and interna ring gear for physical damage as follows: (See fi ure 7-54.)

(1) Scoring - Medium scoring is acceptable. Heavy scoring is unacceptable.

(2) Frosting - Heavy frosting is acceptable.

(3) Pitting - Light pitting is acceptable. Me or heavy pitting is unacceptable.

(4) Spalling - None allowed.

(5) Cracking - None allowed.

NOTE:

For definitions of inspection terms, refer to table 7-2.

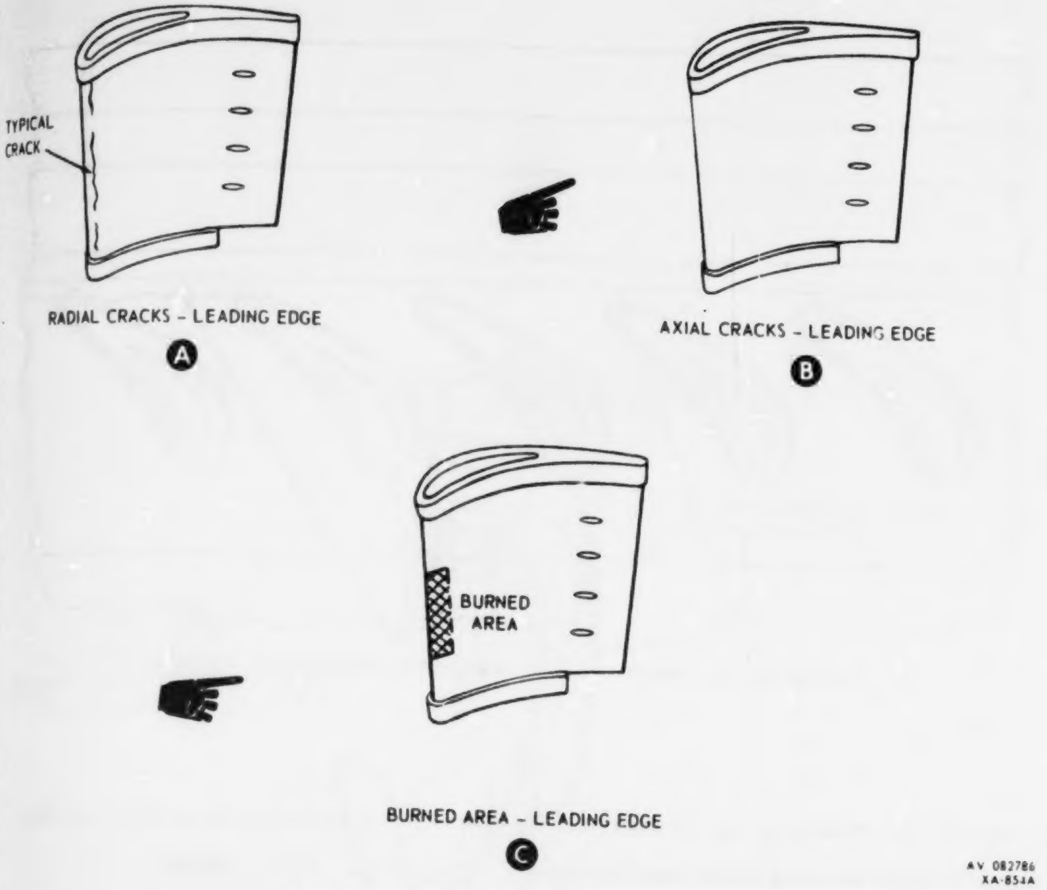

TYPICAL CRACK
RADIAL CRACKS - LEADING EDGE
A
AXIAL CRACKS - LEADING EDGE
B
BURNED AREA
BURNED AREA - LEADING EDGE
C
AV 082786
XA-854A

Figure 7-49. First Stage Gas Producer Nozzle - Vane Leading Edge Inspection Areas (T53-L-15/701)

Inspect reduction gear assembly and sun gear- for crossed or damaged threads. Repair minor d damage as outlined in paragraph 7-136.

Inspect reduction gear assembly, sun gearshaft orquemeter valve and cylinder for nicks, burrs cratches. Blend-repair as outlined in paragraph .

Inspect reduction gear assembly, sun gearshaft, rquemeter valve and cylinder for cracks, ated bolt holes and excessive or uneven wear. ce all parts with these defects.

NOTE

> If edges of sealing rings are defective, reverse edges of each sealing ring on installation. If this fails to correct problem, repair slight defects with crocus cloth (item 23, table 2-2). Replace rings if damage is irreparable.

NOTE

> Whenever the reduction gear assembly is to be returned to overhaul, or if it is to be installed in another engine, the propeller rear bearing support must remain with the reduction gear assembly with the outer bearing race installed. If the propeller shaft rear bearing must be replaced, use a complete new bearing and shim, and rebuild assembly.

g. Inspect sealing rings for damage. If damaged, remove rings (paragraph 6-24) and inspect ring grooves for sharp edges, burrs, nicks, and dents. Blend-repair as outlined in paragraph 7-136.

NOTE

> Perform the following inspections whenever access to the propeller shaft is available (propeller removed). Shafts that exceed inspection limits are to be replaced.

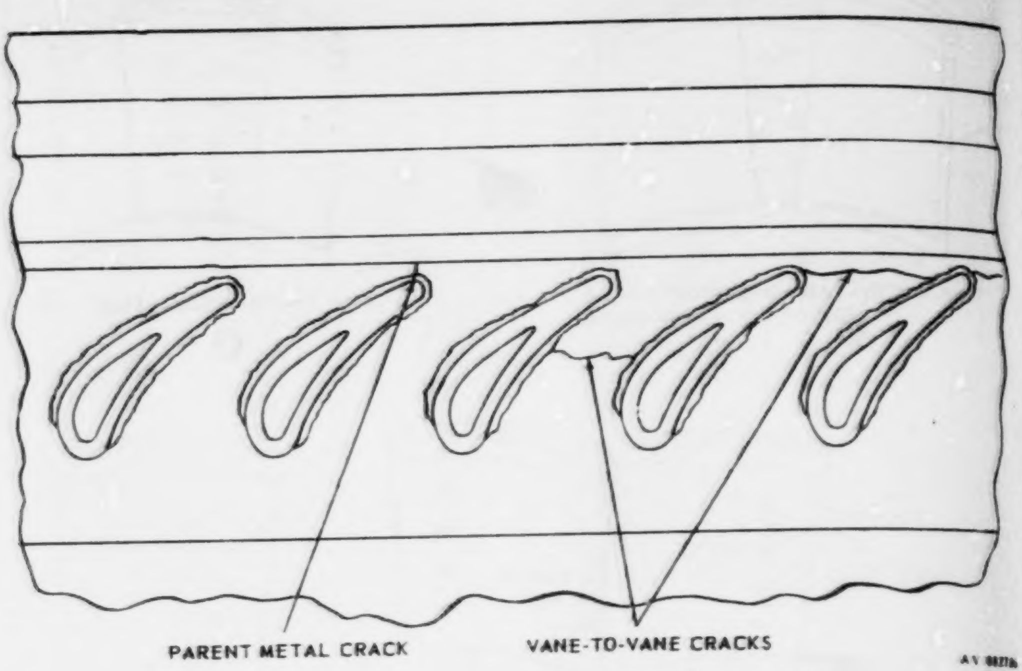


Figure 7-50. First Stage Gas Producer Nozzle - Outer Shroud Inspection Areas (T53-L-15/701)

h. Inspect threaded end of propeller shaft for nicks. Minor nicks less than 0.020 inch deep are acceptable for repair in a maximum of five places, provided they are not associated with cross threading. Repair nicks using blend repair procedure, as outlined in paragraph 7-136 and thread chaser (3.4375-12NS special thread).

i. Inspect threaded end of propeller shaft for gouges. Gouges running axially along threads are acceptable for repair with the following limitations:

(1) One gouge is allowed across 10 threads provided maximum width does not exceed 3/32 inch and depth does not exceed 0.020 inch at any point.

(2) Two gouges are allowed across six threads provided maximum width does not exceed 1/16 inch, depth does not exceed 0.020 inch at any point, and distance from nearest gouge is at least 1/2 inch measured circumferentially.

(3) Repair gouges using blend repair procedure, as outlined in paragraph 7-136, and thread chaser (3.4375-12NS special thread).

NOTE

Prior to accomplishing repair in following step j., ensure that propeller retaining nut can be started freely by hand and run down the length of threads of propeller shaft.

j. Inspect propeller shaft for crossed threads. Crossed threads are acceptable only on the first threads provided inspection limits given in prec steps h. and i. are not exceeded. Repair cross threading with a thread chaser (3.4375-12NS spec thread).

k. Inspect propeller shaft splines area for ni and gouges. Blend repair as outlined in paragraph 7-136.

l. Perform a dye-penetrant check of all repai areas on propeller shaft. No cracks are allowed. Refer to paragraph 7-29.

m. Ship all defective parts to overhaul.

7-72. INSPECTION OF REDUCTION GEAR ASS BLY, SUN GEARSHAFT AND PROPELLER SHAF (T53-L-701 Engines). Proceed as follows:

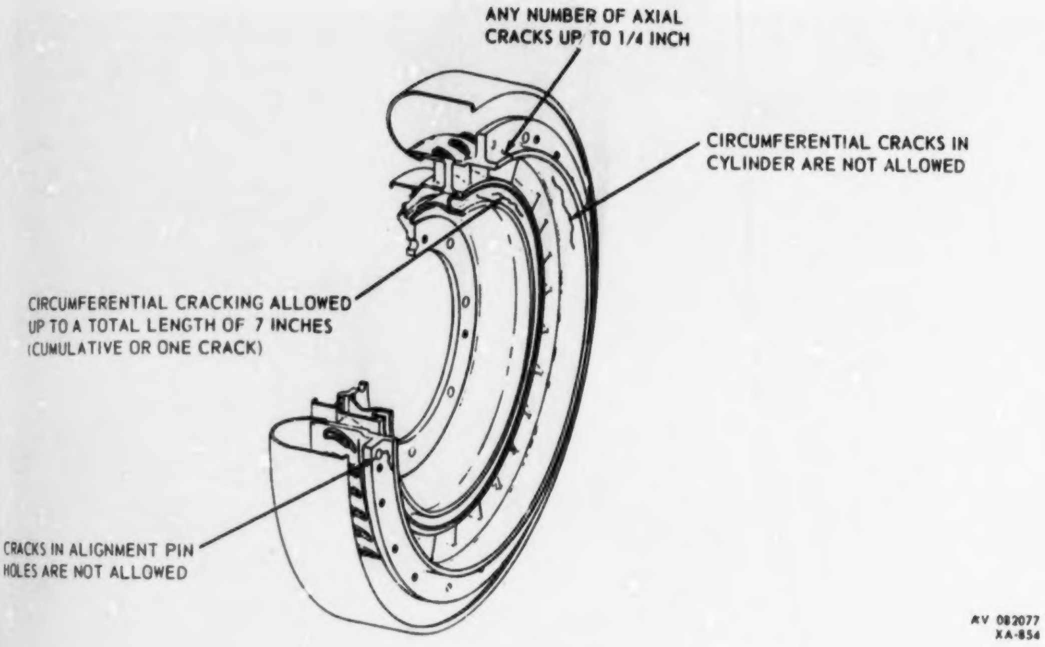
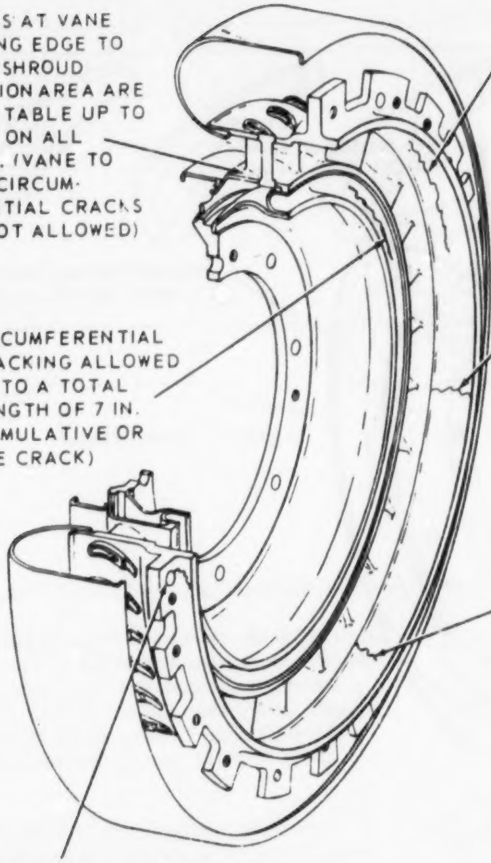

ANY NUMBER OF AXIAL CRACKS UP TO 1/4 INCH
CIRCUMFERENTIAL CRACKS IN CYLINDER ARE NOT ALLOWED
CIRCUMFERENTIAL CRACKING ALLOWED UP TO A TOTAL LENGTH OF 7 INCHES (CUMULATIVE OR ONE CRACK)
CRACKS IN ALIGNMENT PIN HOLES ARE NOT ALLOWED
AV 082077
XA-854

Figure 7-51. First Stage Turbine Nozzle Assembly (1-110-520-14 and 1-110-520-21) Crack Limits (T53-L-15/701)


CRACKS AT VANE LEADING EDGE TO INNER SHROUD JUNCTION AREA ARE ACCEPTABLE UP TO 1/4 IN. ON ALL VANES. (VANE TO VANE CIRCUMFERENTIAL CRACKS ARE NOT ALLOWED)
CIRCUMFERENTIAL CRACKS IN CYLINDER WALL ARE NOT ALLOWED
FIVE AXIAL CRACKS ALLOWED TO PROGRESS THROUGH CYLINDER TO OUTER SHROUD RADIUS PROVIDED THEY DO NOT EXTEND MORE THAN 1/4 IN. BEYOND RADIUS AND DEFECTS ARE SEPARATED BY A MINIMUM OF EIGHT VANES
CIRCUMFERENTIAL CRACKING ALLOWED UP TO A TOTAL LENGTH OF 7 IN. (CUMULATIVE OR ONE CRACK)
ANY NUMBER OF AXIAL CRACKS UP TO 1/4 IN. ARE ALLOWED IN RADIUS AREA PROVIDED BUCKLING IS NOT EVIDENT
CRACKS IN ALIGNMENT PIN HOLES ARE NOT ALLOWED
AV 081054
XA-854

7-51A. First Stage Turbine Nozzle Assembly (1-110-520-19) - Crack Limits (T53-L-15/701)

Figure 7-52. First Stage Gas Producer Nozzle Support and Curl - Hot Spots and Wear Depressions (T53-L-15/701)

Table 7-6. **First Stage Gas Producer Nozzle Assembly - Inspection Limits**

STEP NO.	DEFECT	FIG. REF.	INSPECTION LIMITS	
			1-110-520-14 & -21	1-110-520-19
			VANE TRAILING EDGE	
1.	Cracks	A, Fig. 7-48		**NOTE** Do not measure cracks from any portion of manufacturer's blend repair (see figure 7-47). Where cracks occur in this area, use vane trailing edge as a reference point.
			a. Any number of cracks less than 1/8 inch long are acceptable on each vane	a. Any number of cracks up to 1/4 inch long are acceptable on each vane
		A, Fig. 7-48	b. Maximum of two 3/8 inch nonconverging tight-lipped cracks are acceptable on each vane	b. One crack 1/4 to 1/2 inch is acceptable on each vane
				c. Cracks at junction of vane trailing edge and outer shroud are acceptable on all vanes
		B, Fig. 7-48		d. Cracks progressing to vane cooling holes are acceptable
		C, Fig. 7-48		e. Cracks radiating toward one another are not acceptable. Minimum distance between converging cracks is 1/4 inch
2.	Burning	D, Fig. 7-48		**NOTE** Do not include manufacturer's blend repair (see figure 7-47) in measurement of burned area
			A burned area up to 3/8 inch radial length by 1/4 inch axial length is acceptable on a maximum of five vanes	A burned area up to 3/8 inch radial length by 1/4 inch axial length is acceptable on a maximum of five vanes.
3.	Material Loss			**NOTE** Do not consider manufacturer's blend repair (see figure 7-47) as loss of material.
				Loss of material caused by other than burning or foreign object damage is acceptable, provided vane distortion is not evident and core penetration has not occurred.

Table 7-8. First Stage Gas Producer Nozzle Assembly - Inspection Limits (Cont)

STEP NO.	DEFECT	FIG. REF.	INSPECTION LIMITS	
			1-110-520-14 & -21	1-110-520-19
			VANE LEADING EDGE	
4.	Radial Cracks	A, Fig. 7-49	Any number and size of cracks is acceptable on each vane, provided core is not penetrated	Any number and size of cracks is acceptable on each vane, provided core is not penetrated
			NOTE Core is considered to be penetrated when crack is breached and core is visible.	
5.	Axial Cracks	B, Fig. 7-49	Any number and size of cracks is acceptable on each vane, provided core is not penetrated	One crack up to 1/2 inch in length is acceptable on each vane, provided core is not penetrated
6.	Burning	C, Fig. 7-49	Burning is acceptable on each vane, provided core is not penetrated	Burning is acceptable on each vane, provided core is not penetrated
			VANE SURFACE	
7.	Warpage and Distortion		Warpage or distortion of vane surface is not acceptable	Warpage or distortion of vane surface is not acceptable
8.	Nicks, Dents, and Burrs		Minor light nicks, dents, and burrs are acceptable. Repair not permitted because of possible damage to vane coating	Minor light nicks, dents, and burrs are acceptable. Repairs not permitted because of possible damage to vane coating
9.	Spalling		Any amount of spalling is acceptable on all vanes	Any amount of spalling is acceptable on all vanes
			OUTER SHROUD AND CYLINDER	
10.	Parent Metal Cracks	Fig. 7-50	On repaired nozzles (identified by markings PSK 11617-01), any number of cracks not exceeding 3/16 inch in length extending from trailing edge of vanes are acceptable. On all other nozzles, any number of cracks up to 1/16 inch long extending from trailing edge of vanes are acceptable	
11.	Shroud-to-Vane Brazement Cracks	Fig. 7-50	Cracks up to 3/4 inch long are acceptable on all vane brazements. Cracks up to 1-1/4 inch long are acceptable on a maximum of 10 vanes	
12.	Vane-to-Vane Cracks	Fig. 7-50	On repaired nozzles (identified by markings PSK 11617-01), a maximum of 10 vanes are acceptable provided no more than four vanes are cracked adjacent to each other in any one group. On all other nozzles, no cracks are acceptable	Not acceptable

Table 7-6. First Stage Gas Producer Nozzle Assembly - Inspection Limits (Cont)

STEP NO.	DEFECT	FIG. REF.	INSPECTION LIMITS	
			1-110-520-14 & -21	1-110-520-19
			OUTER SHROUD AND CYLINDER (Cont)	
13.	Cylinder	Fig. 7-51 Fig. 7-51A	Any number of axial cracks up to 1/4 inch long extending forward from aft face of flange are acceptable. Circumferential cracks are not allowed	A maximum of five tight-lipped axial cracks progressing from trailing edge of cylinder through the cylinder/outer shroud radius are acceptable, provided defects do not extend more than 1/4 inch beyond radius and are separated by a minimum of eight vanes.. Any number of small axial cracks in radius area up to 1/4 inch in length are allowed, provided no buckling is evident. Circumferential cracks are not allowed. A maximum of three additional axial cracks at random locations are allowed up to 3/4 inch in length
13A.	Cylinder Flange	Fig. 7-51 Fig. 7-51A	**NOTE** Whenever access is gained to the cylinder mounting flange perform the following inspection:	
			Inspect flange for cracks emanating from the three alignment pin holes. This condition is unacceptable and is cause for replacement of nozzle	Inspect flange for crack emanating from the three alignment pin holes. This condition is unacceptable and is cause for replacement of nozzle
			INNER SHROUD AND DEFLECTOR	
14.	Inner Shroud Cracks	Fig. 7-51A		Cracks at vane leading edge to inner shroud junction area are acceptable up to 1/4 inch on all vanes. Vane-to-vane and circumferential cracking are not allowed
15.	Deflector Cracks	Fig. 7-51 Fig. 7-51A	Circumferential cracking is acceptable up to a total length of 7 inches (cumulative or one crack)	Circumferential cracking is acceptable up to a total length of 7 inches (cumulative or one crack)

Table 7-6. First Stage Gas Producer Nozzle Assembly - Inspection Limits (Cont)

DEFECT	FIG. REF.	INSPECTION LIMITS	
		1-110-520-14 & -21	1-110-520-19
		SUPPORT AND CURL	
Buckling of Support		Acceptable, provided tip clearances are maintained	Acceptable, provided tip clearances are maintained
(Deleted)			
Hot Spot, Cracks, and Wear in Curl OD	Fig. 7-52	Local hot spots caused by contact with combustion chamber liner are acceptable as shown. Wear depressions caused by rubbing of combustion chamber liner dimples are acceptable, provided no breakthrough or raised impressions are evident on curl ID. Circumferential cracks are not allowed. Repair axial cracks or unacceptable wear depressions as outlined in paragraph 7-169	Local hot spots caused by contact with combustion chamber liner are acceptable as shown. Wear depressions caused by rubbing of combustion chamber liner dimples are acceptable, provided no breakthrough or raised impressions are evident on curl ID. Circumferential cracks are not allowed. Repair axial cracks or unacceptable wear depressions as outlined in paragraph 7-169

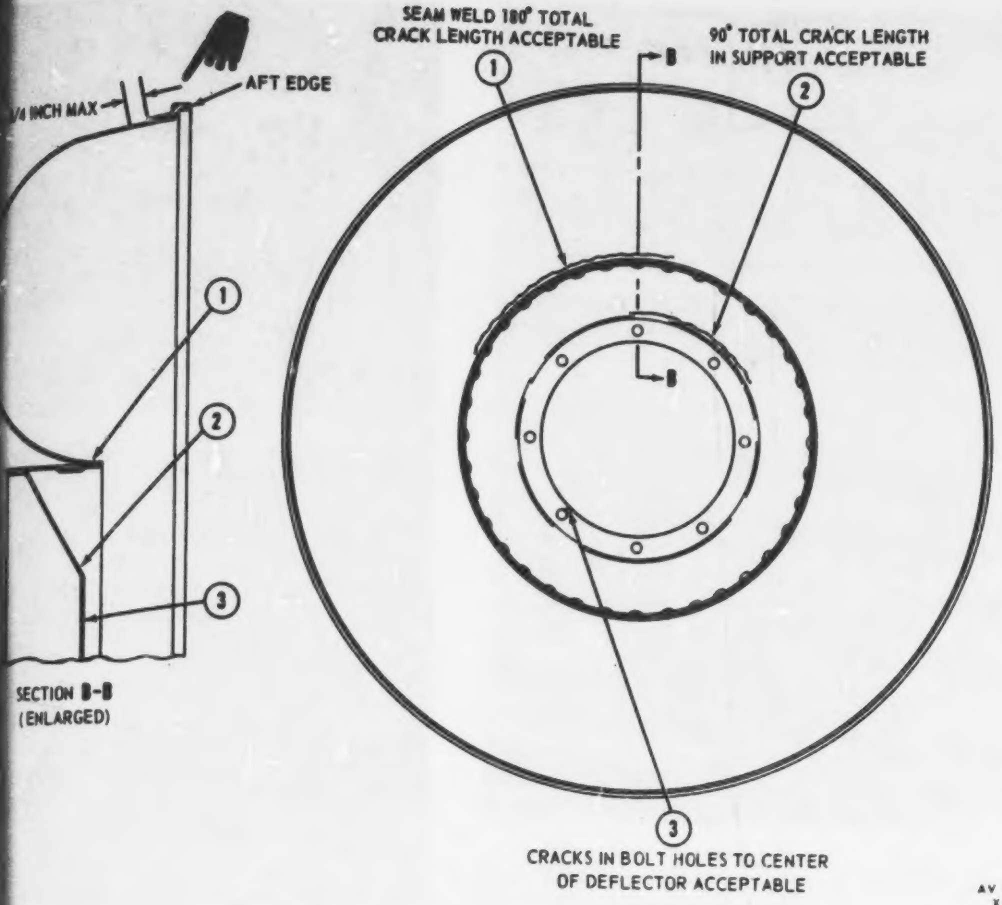

SEAM WELD 180° TOTAL
CRACK LENGTH ACCEPTABLE
①
B
90° TOTAL CRACK LENGTH
IN SUPPORT ACCEPTABLE
②
/4 INCH MAX
AFT EDGE
①
②
③
B
SECTION B-B
(ENLARGED)
③
CRACKS IN BOLT HOLES TO CENTER
OF DEFLECTOR ACCEPTABLE
AV 082791
XA-854A

Figure 7-53. Combustion Chamber Deflector - Inspection Limits (T53-L-15/701)

NOTE

e gears to ensure complete inspection
teeth.

a 3-power magnifying glass, a flashlight,
anic's mirror, inspect all parts for physi-
as follows:

isually inspect primary sun gearshaft,
net gears, secondary sun gear, secondary
s, and secondary ring gear for:

) Scoring - Light scoring is acceptable.
heavy scoring is unacceptable.

) Frosting - Medium frosting is accept-
y frosting is unacceptable.

) Pitting - Light pitting is acceptable.
nd heavy pitting is unacceptable.

Spalling and Cracking - Unacceptable.

NOTE

For definitions of inspection terms, refer to table 7-2. (See figure 7-54.)

(2) Inspect threaded parts for stripped or crossed threads. Repair threads as outlined in paragraph 7-138.

(3) Inspect gear nuts and lock cups for security.

b. Minor repairs may be performed on damaged threads on the reduction gear assembly and sun gearshaft which are accessible without further disassembly.

NOTE

Perform the following inspections whenever access to the propeller shaft is available (propeller removed). Shafts that exceed inspection limits are to be replaced.

MEDIUM SCORING
MEDIUM FROSTING
LIGHT PITTING

Figure 7-54. Gear Inspection (Sheet 1 of 3)

c. Inspect threaded end of propeller shaft for nicks. Minor nicks less than 0.020 inch deep are acceptable for repair in a maximum of five places, provided they are not associated with cross threading. Repair nicks using blend repair procedure, as outlined in paragraph 7-136, and thread chaser (3.4375-12NS special thread).

d. Inspect threaded end of propeller shaft for gouges. Gouges running axially along threads are acceptable for repair with the following limitations:

(1) One gouge is allowed across 10 threads provided maximum width does not exceed 3/32 inch and depth does not exceed 0.020 inch at any point.

(2) Two gouges are allowed across six threads provided maximum width does not exceed 1/16 inch, depth does not exceed 0.020 inch at any point, and distance from nearest gouge is at least 1/2 inch measured circumferentially.

(3) Repair gouges using blend repair procedure as outlined in paragraph 7-136 and thread chaser (3.4375-12NS special thread).

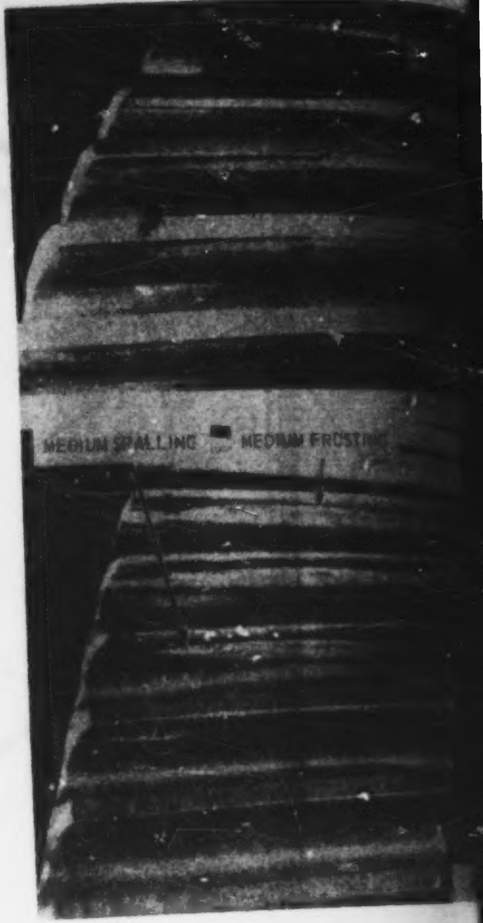


Figure 7-54. Gear Inspection (Sheet 2 o

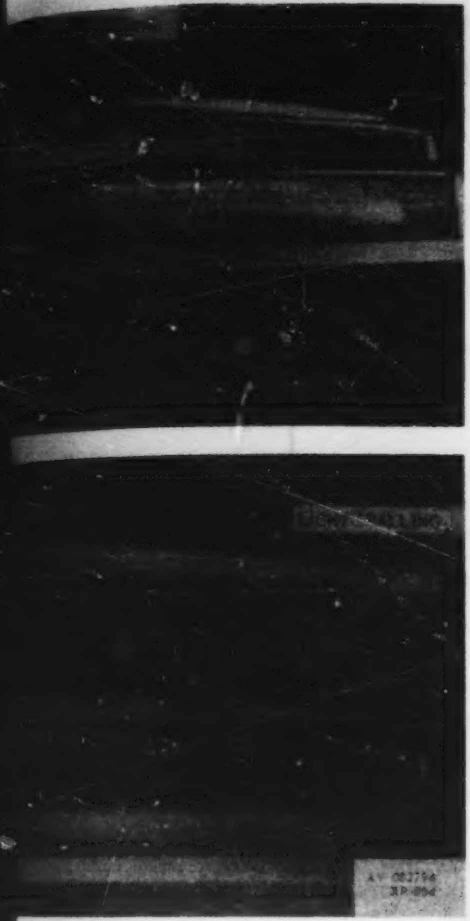
NOTE

Prior to accomplishing repair in follow
step e., ensure that propeller retaining
nut can be started freely by hand and
run down the length of threads of pro-
peller shaft.

e. Inspect propeller shaft for crossed thr
Crossed threads are acceptable only on the fi
threads, provided inspection limits given in p
steps c. and d. are not exceeded. Repair cr
threading with a thread chaser (3.4375-12N
thread).

f. Inspect propeller shaft splines area fo
and gouges. Blend repair as outlined in par
7-136.

g. Perform a dye-penetrant check of all
areas on propeller shaft. No cracks are al
(Refer to paragraph 7-29.)



igure 7-54. Gear Inspection (Sheet 3 of 3)

there is major damage requiring further dis-
ly, ship reduction gear assembly to Overhaul.

NSPECTION OF REAR BEARING SUPPORT
BLY. Proceed as follows:

isually inspect support for nicks, dents, pits,
tches. Blend-repair as outlined in paragraph

isually inspect for clogged oil passages. Clear
oil passages with a suitable wire and clean

isually inspect for elongated holes. Replace
tive parts.

pect threaded parts for crossed or damaged
Repair threads as outlined in paragraph 7-

NSPECTION OF COMPRESSOR AND IMPELL-
SING ASSEMBLIES (T53-L-7/7A Engines).
as follows:

a. Visually inspect stator vanes, shrouds, and compressor and impeller housings for nicks, burrs, and cracks. Repair nicks, burrs, and cracks as outlined in paragraph 7-173.

aA. Inspect mating flanges of axial and centrifugal compressor housings for corrosion. Observe the following repair limitations.

(1) Corrosion, including light pitting to a depth of 0.020 inch without breakthrough or causing external leakage, is acceptable after repair. Proceed as follows:

CAUTION

Use care when brushing with fiber brush so as not to mar finish of nonaffected surrounding parts.

(a) Refinish according to steps aA. through e. of paragraph 7-143.

(b) Complete refinishing according to step i. of paragraph 7-143.

(2) Corrosion, with pitting greater than 0.020 inch in depth but not causing external leakage or possibility of material fallout, should be repaired according to paragraph 7-143 instructions but using Preferred Method - epoxy sealant application.

(3) Corrosion creating external leakage or a possibility of material fallout is nonrepairable and is cause for part replacement.

b. Inspect all threaded parts for crossed or damaged threads. Replace crossed or damaged threads as outlined in paragraph 7-137.

c. Inspect leading and trailing edges of each vane for nicks, burrs, pits, and dents. Repair as outlined in paragraph 7-173.

d. Check each vane for bending or distortion. Repair vane as outlined in paragraph 7-173.

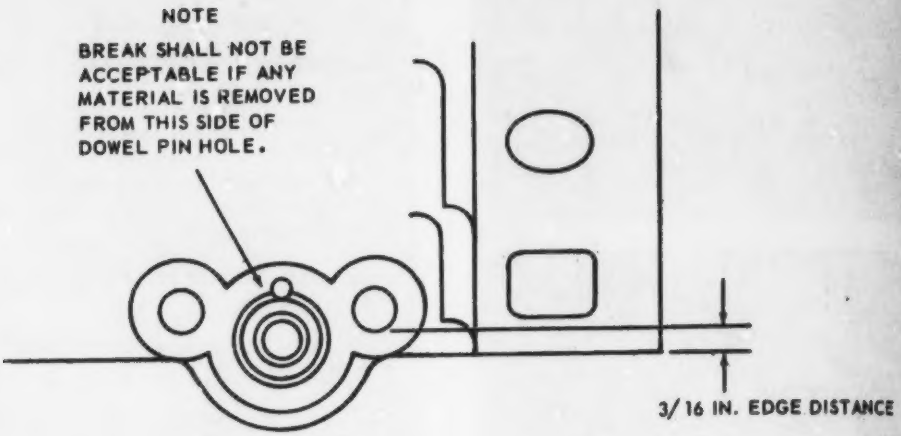
e. Inspect vanes for cracks in inner and outer shroud. Repair as outlined in paragraph 7-173.

f. Inspect leading and trailing edges of each vane for nicks, burrs, cracks, pits, and dents. No cracks are permitted in airfoil leading or trailing edges. Repair as outlined in paragraph 7-173.

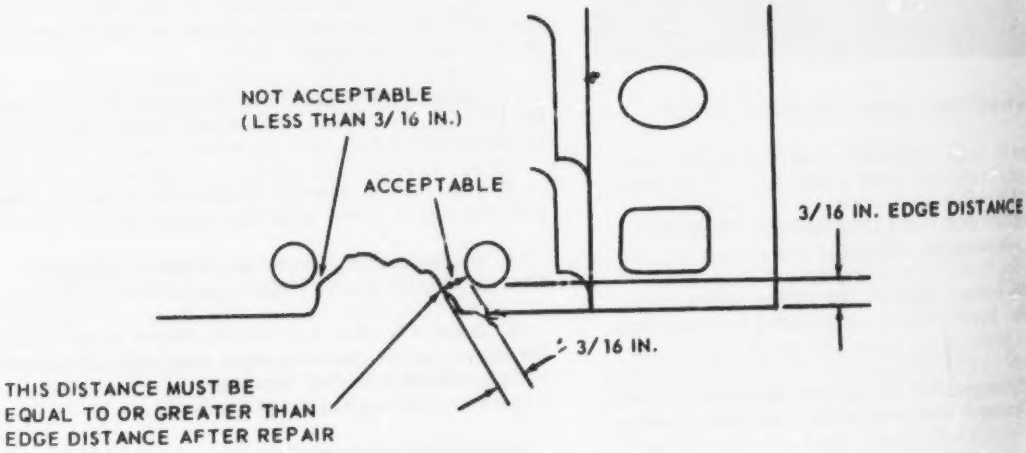
g. Cracks in brazements are permitted if they do not exceed 1/8 inch in length and affect no more than five vanes per assembly half. Cracks that extend into parent metal are not permitted.

h. Inspect axial compressor housings as follows: (See figure 7-55.)

(1) Visually inspect housing for nicks, burrs, cracks, and irreparable distortion. Repair nicks, burrs, and cracks as outlined in paragraph 7-173.


NOTE
BREAK SHALL NOT BE ACCEPTABLE IF ANY MATERIAL IS REMOVED FROM THIS SIDE OF DOWEL PIN HOLE.
3/16 IN. EDGE DISTANCE

NORMAL EAR


NOT ACCEPTABLE (LESS THAN 3/16 IN.)
ACCEPTABLE
3/16 IN. EDGE DISTANCE
≥ 3/16 IN.
THIS DISTANCE MUST BE EQUAL TO OR GREATER THAN EDGE DISTANCE AFTER REPAIR

BROKEN EAR

Figure 7-55. Compressor Housing - Damage Limits (T53-L-7/7A)

(3) Visually inspect dowel pin mating pad areas.

(a) One pad per housing half may be broken

(b) If each half has a broken pad, it must cated in the same corner.

(c) The distance from bolt holes to edge of ing must not be less than 3/16 inch.

(4) Inspect dowel pin mating pad areas, using penetrant method.

(a) Small tight-lipped cracks less than one in length are acceptable, provided they can be ved by repair-blending and a 3/16 inch mini- edge distance is maintained. (Refer to para- h 7-136.)

(b) Cracks which are breached or more one inch in length are cause for rejection of ing.

Inspect centrifugal impeller housing as follows:

(1) Visually inspect housings for nicks, burrs, s, and irreparable distortion. Repair nicks, s and cracks as outlined in paragraph 7-173.

(2) Inspect dowel pin mating pad areas on both ing halves using dye-penetrant method.

(a) Small tight-lipped cracks less than one long should be blend-repaired and reinspected.

(b) Cracks that are breached or are more one inch in length are cause for rejection of ller housing assembly.

INSPECTION OF COMPRESSOR AND IM- LER HOUSING ASSEMBLIES (T53-L-15/701 es). Proceed as follows:

Visually inspect housings for nicks, burrs, and s. Repair as outlined in paragraph 7-174.

A. Inspect mating flanges of axial and centrifugal ressor housings for corrosion. Observe the ing repair limitations.

(1) Corrosion, including light pitting to a depth inch without breakthrough or causing external e is acceptable after repair. Proceed as follows:

CAUTION

Use care when brushing with fiber brush so as not to mar finish of nonaffected surrounding parts.

(a) Refinish according to steps aA. through paragraph 7-143.

(b) Complete refinishing according to step paragraph 7-143.

(2) Corrosion with pitting greater than 0.020 inch in depth but not causing external leakage or possibility of material fallout should be repaired according to paragraph 7-143 instructions but using Preferred Method - epoxy sealant application.

(3) Corrosion creating external leakage or a possibility of material fallout is nonrepairable and is cause for part replacement.

b. Inspect all threaded parts for crossed or damaged threads. Replace crossed or damaged threads as outlined in paragraph 7-137.

c. Inspect leading and trailing edges of each stator vane for nicks, burrs, pits, and dents. Blend repair as outlined in paragraph 7-136.

d. Check each vane for bending or distortion. Repair as outlined in paragraph 7-174.

e. Inspect vanes for cracks in inner and outer shroud brazements. Cracks in the inner and outer shroud brazement are permitted if they do not exceed 1/8 inch in length and affect no more than five vanes per assembly half. Cracks that extend into parent metal are not permitted.

f. Visually inspect axial compressor housing halves for broken dowel hole ears. Repair as outlined in paragraph 7-174.

g. Visually inspect impeller housing assembly for cracks in the housing to air diffuser mounting hole bosses. Two tight-lipped cracks per housing half are acceptable, provided they do not occur on the same hole and are located on the outboard portion of the boss. (See figure 7-56.)

h. Visually inspect parts for distortion. Repair as outlined in paragraph 7-174.

7-76. INSPECTION OF CENTRIFUGAL COMPRESSOR IMPELLER ASSEMBLY. Proceed as follows:

NOTE

No cracks or blade bending are permitted. Length of all repairs must be at least two but not more than four times the depth.

a. Visually inspect centrifugal compressor for nicks, burrs, cracks, dents, and bending. For inspection and repair limits, see figure 7-57.

b. If damage to centrifugal compressor impeller exceeds limits, or if damage is in critical area, return engine to Overhaul for replacement of impeller.

c. Blend repair of impeller can be accomplished if held to the limits specified in paragraph 7-175.

7-77. INSPECTION OF COMPRESSOR ROTOR BLADES (T53-L-7/7A Engines). With compressor housing half removed from engine (paragraph 3-57), proceed as follows:

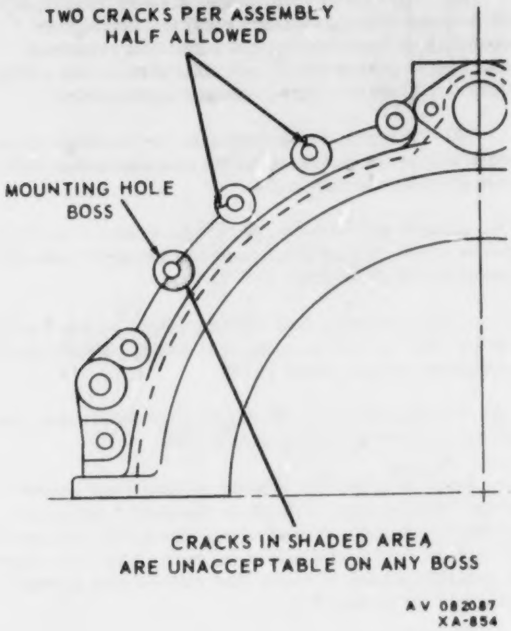

TWO CRACKS PER ASSEMBLY HALF ALLOWED
MOUNTING HOLE BOSS
CRACKS IN SHADED AREA ARE UNACCEPTABLE ON ANY BOSS
AV 082087
XA-854

Figure 7-56. Impeller Housing Mounting Hole Bosses - Inspection Limits (T53-L-15/701)

a. Check each blade for bends or distortion. Replace bent or distorted blades.

NOTE

All damage or defects shall be identified and marked with yellow pencil (item 125, table 2-2).

b. Inspect leading, trailing, and tip edges of each blade for nicks, burrs, pits, dents, or cracks and foreign object damage. Repair as outlined in paragraph 7-176. (See figure 7-58.)

NOTE

Maximum allowable tip shake is 0.004 inch. For removal of damaged blades from compressor rotor assembly, refer to paragraph 7-178.

c. Mount dial indicator and position contact arm of indicator against blade 0.5 inch above blade root. Secure compressor rotor assembly to prevent any rotational movements and check tip shake (circumferential movement) of each blade. Maximum acceptable tip shake for all stages is 0.004 inch.

d. Inspect blades for protrusion forward or aft of disc face. If any blade protrudes further than 0.015 inch, repair as outlined in paragraph 7-176.

e. Visually inspect all blades for evidence of varnish buildup. Varnish will appear as dark fil consisting of oil and dirt deposits that have harde on blade surfaces. Remove varnish buildup as outlined in paragraph 7-176.

f. Whenever upper half of compressor housing is removed for any reason, an ultrasonic inspection of second stage compressor blades may be perform

(1) (Deleted)

NOTE

Follow instructions carefully as outlined in operation and calibration instructions for flaw detector test set.

(2) Using ultrasonic flaw detector test set (LTCT4188), inspect second stage compressor blades.

(3) If test set detects any damaged blades, identify and replace. (Refer to paragraph 7-178.)

(4) (Deleted)

7-78. INSPECTION OF COMPRESSOR ROTOR BLADES (T53-L-15/701 Engines). With compres housing half removed from engine (paragraph 3-5 proceed as follows:

NOTE

All damage or defects shall be identified and marked with a marking pencil (yellow) Colorbrite No. 2107 (item 72, table 2-2).

a. Inspect first stage blades for evidence of c pressor inlet blockage. If blockage is confirmed b presence of foreign material such as grass, rags, etc., remove and replace all first and second st blades. (Refer to paragraph 7-179.)

b. If blockage is suspected but not confirmed, spect first stage blades as follows and apply gra coating to acceptable blades as outlined in parag 7-177A.

NOTE

If available facilities do not permit the following inspection and graphite treatment, remove defective blades and replace with acceptable blades. Forward used blades to depot for determination of serviceability.

(1) Rotate rotor and visually inspect for b or distorted blades. Replace bent or distorted bl

NOTE

Removal of blades is required for the following inspection. (Refer to paragraph 7-179.) If blade roots are coated with graphite varnish, remove coating per AMS3132.

(2) Magnetic-particle inspect blades for cracks. efer to paragraph 7-30.) No cracks are permitted.

CAUTION

If a crack is detected in any blade, all blades in the first and second stage must be scrapped and replaced.

c. Using standard inspection equipment, inspect st stage blades for sand and dust erosion as llows:

(1) Inspect leading edge of blades for under- ting, erosion roughness and slight rolled-over ect. (See figure 7-58A.) Rolled-over effect can be ected by running finger nail along airfoil on convex e until leading edge is contacted.

(2) Using a straight edge (6 inch scale or equi- lent) placed slightly above platform radius, and a 0156 inch wire gage used as a "Go" or "No go" ice, determine the degree of undercutting. (See re 7-58B.) A maximum of 0.0156 inch is permis- le along leading edge area between platform radius tip. A wavy pattern (more than one undercut a) is unacceptable. If within limits, repair by ing blades on leading edge only (from blade tip to form radius) to remove sharp projections and -over burrs. Strokes shall be parallel to leading e.

(3) Measure chordal width at midpoint of es. Blades are acceptable if chordal width is 2 inch or greater. (See figure 7-58C.) If limit t be met, replace defective blades. (Refer to graph 7-179.)

(4) Erosion roughness and roll-over effect is ptable, provided the above requirements are met.

(5) Visually inspect for nicks, burrs, dents other foreign object damage. (See figure 7-59.) ace blades that exceed limits.

d. Using a strong light source, visually inspect and second stage blades for corrosion pitting. ting is suspected, confirm using a scribe. No osion pitting is acceptable. Replace defective es.

e. Inspect all blades as follows:

(1) Visually inspect each blade for bends or distortion. Replace bent or distorted blades.

(2) Visually inspect leading, trailing, tip edges, and airfoil surfaces of each blade for nicks, burrs, pits, dents or cracks, and foreign object damage. (See figure 7-59.) Repair as outlined in paragraph 7-177.

(3) Inspect blades for protrusions forward or aft of disc faces. If any blade protrudes further than 0.015 inch, repair as outlined in paragraph 7-177.

(4) Visually inspect each blade for evidence of varnish buildup. Varnish will appear as dark film, consisting of oil and dirt deposits that have hardened on blade surfaces. Remove varnish as outlined in paragraph 7-177.

(5) Visually inspect each blade for cracks. Use dye-check on suspect blades. If cracks are found, replace defective blades.

CAUTION

If cracks are found on any first stage blade, scrap all first and second stage blades and replace with new blades.

7-79. INSPECTION OF COMPRESSOR ROTOR SPACERS AND DISCS. Proceed as follows:

a. Inspect spacers for nicks, dents, and rubs. Minor nicks, dents, and rubs are acceptable.

b. Inspect disc for cracks, nicks, dents, and gouges. Damage other than minor, well-spaced dents are not acceptable.

7-80. INSPECTION OF AIR INLET VANE ASSEMBLY (T53-L-7/7A Engines). Proceed as follows:

a. Visually inspect leading edge of air inlet vanes by looking into inlet housing. Use a magnifying glass and lights as necessary.

CAUTION

Do not straighten bent air inlet vanes.

b. If compressor housing has been removed, visually inspect each vane for cracks, nicks, dents, pits, and distortion. (See figure 7-60.)

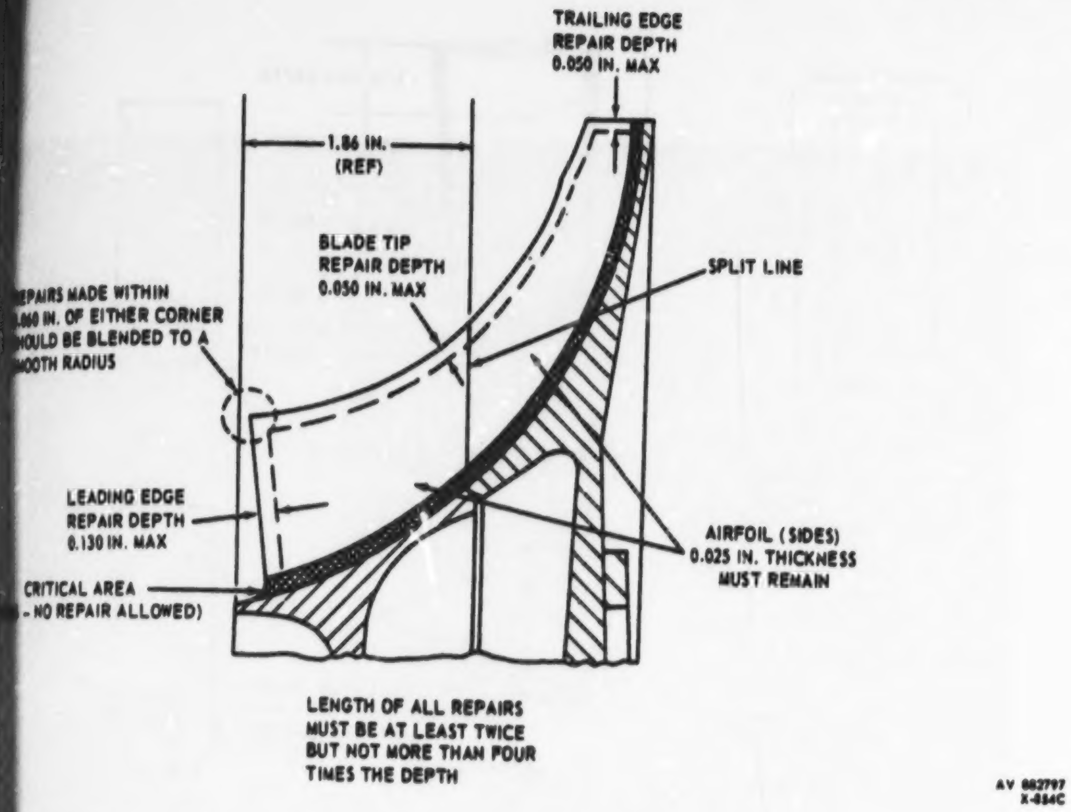

TRAILING EDGE
REPAIR DEPTH
0.050 IN. MAX
1.86 IN.
(REF)
BLADE TIP
REPAIR DEPTH
0.050 IN. MAX
SPLIT LINE
EPAIRS MADE WITHIN
.060 IN. OF EITHER CORNER
HOULD BE BLENDED TO A
OOTH RADIUS
LEADING EDGE
REPAIR DEPTH
0.130 IN. MAX
AIRFOIL (SIDES)
0.025 IN. THICKNESS
MUST REMAIN
CRITICAL AREA
- NO REPAIR ALLOWED)
LENGTH OF ALL REPAIRS
MUST BE AT LEAST TWICE
BUT NOT MORE THAN FOUR
TIMES THE DEPTH
AV 002797
X-884C

Figure 7-57. Centrifugal Compressor Impeller - Inspection and Repair Limits

NOTE

s with smooth contours are accept-
without rework if they do not exceed
ir limits. (See figure 7-60.)

CAUTION

cts shall be blend repaired only to ex-
of removing protrusions that affect
path.

NOTE

ce between two dents is less than
er dimension of either dent, they will
onsidered as one dent. All repairs
be blended and finished smoothly.
h strokes of all repair work shall be
llel to leading and trailing edges of

Vane leading or trailing edge nicks, dents,
e acceptable up to 0.050 inch depth with no
rations and up to 0.300 inch radial length.

(2) Vane airfoil surface nicks, dents, and pits are acceptable up to 0.040 inch in depth and 0.300 inch in length.

(3) In vane leading or trailing edge weldments only one crack, not exceeding 0.250 inch in length, is acceptable without repair.

(4) No cracks are permitted in vane parent metal.

(5) Vane distortion is acceptable on leading edges up to 0.060 inch and on trailing edges up to 0.030 inch.

c. Inspect shrouds and vane-to-shroud brazement. Cracks not exceeding 0.250 inch in length are acceptable.

d. Repair nicks, burrs, pits, and dents with small swiss type file or carborundum stone. Use crocus cloth (item 23, table 2-2) for final polishing. (See figure 7-70 for repair limits.)

e. If limits are exceeded, tag engine and forward to Overhaul.

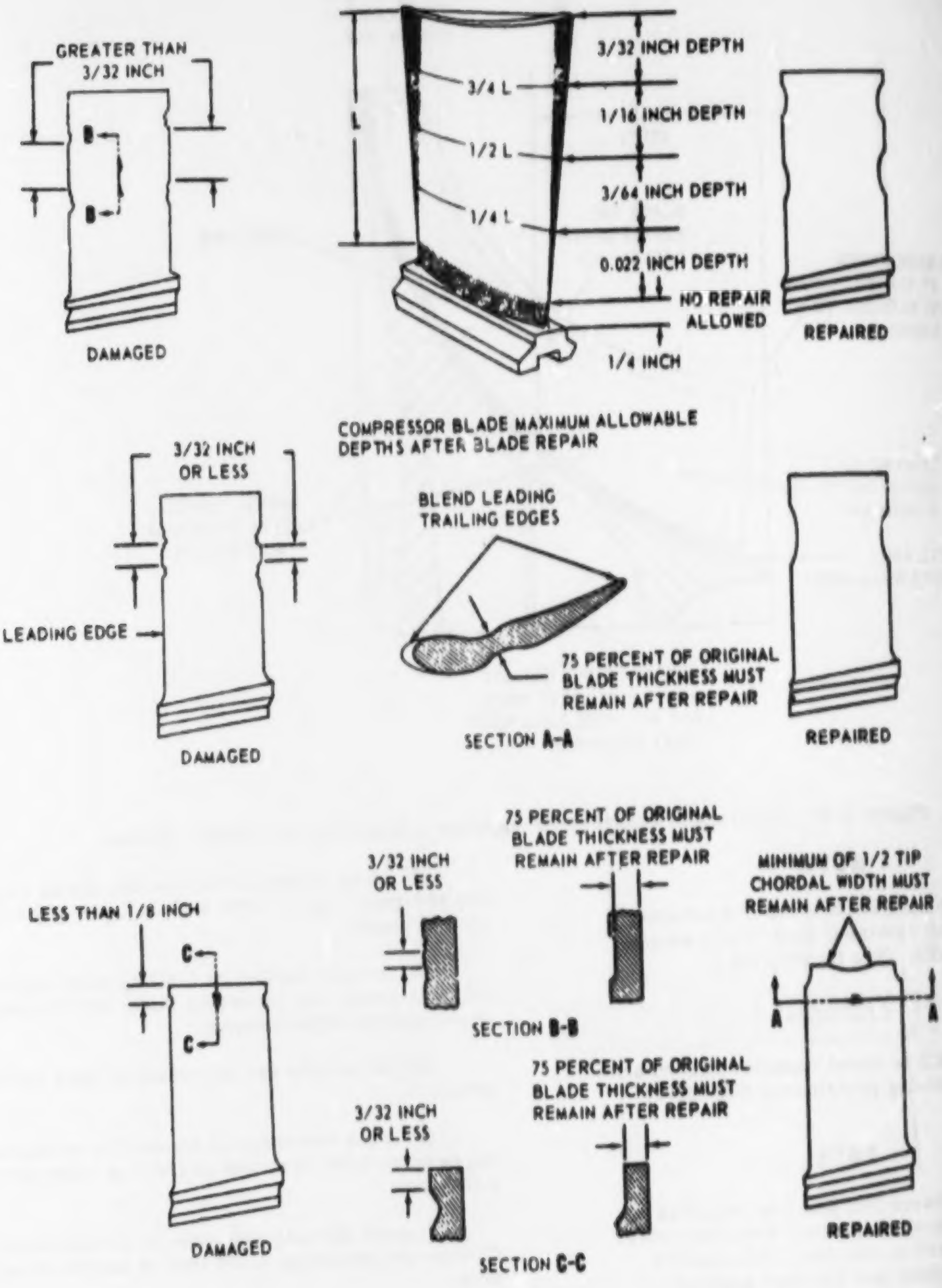

GREATER THAN 3/32 INCH
B
B
DAMAGED
L
3/4 L
1/2 L
1/4 L
3/32 INCH DEPTH
1/16 INCH DEPTH
3/64 INCH DEPTH
0.022 INCH DEPTH
NO REPAIR ALLOWED
1/4 INCH
REPAIRED
COMPRESSOR BLADE MAXIMUM ALLOWABLE DEPTHS AFTER BLADE REPAIR
3/32 INCH OR LESS
LEADING EDGE
DAMAGED
BLEND LEADING TRAILING EDGES
75 PERCENT OF ORIGINAL BLADE THICKNESS MUST REMAIN AFTER REPAIR
SECTION A-A
REPAIRED
LESS THAN 1/8 INCH
C
C
DAMAGED
3/32 INCH OR LESS
75 PERCENT OF ORIGINAL BLADE THICKNESS MUST REMAIN AFTER REPAIR
SECTION B-B
3/32 INCH OR LESS
75 PERCENT OF ORIGINAL BLADE THICKNESS MUST REMAIN AFTER REPAIR
SECTION C-C
MINIMUM OF 1/2 TIP CHORDAL WIDTH MUST REMAIN AFTER REPAIR
A
A
REPAIRED

Figure 7-58. Compressor Rotor Blade Damage-Before and After Repair (All Stages)(T53-L7/7A)

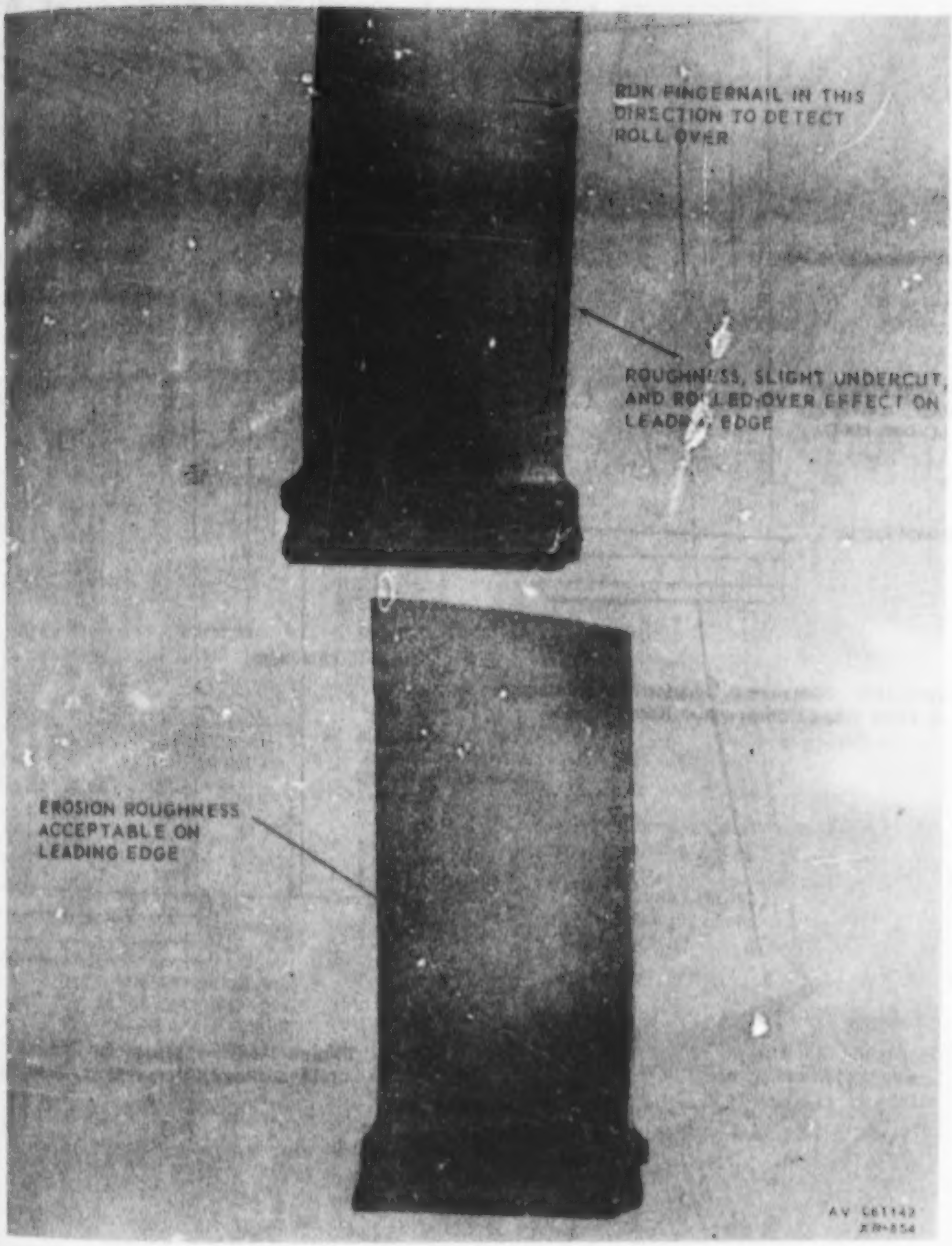

RUN FINGERNAIL IN THIS DIRECTION TO DETECT ROLL OVER
ROUGHNESS, SLIGHT UNDERCUT, AND ROLLED-OVER EFFECT ON LEADING EDGE
EROSION ROUGHNESS ACCEPTABLE ON LEADING EDGE

Figure 7-58A. Sand and Dust Erosion Inspection of First Stage Compressor Rotor Blade

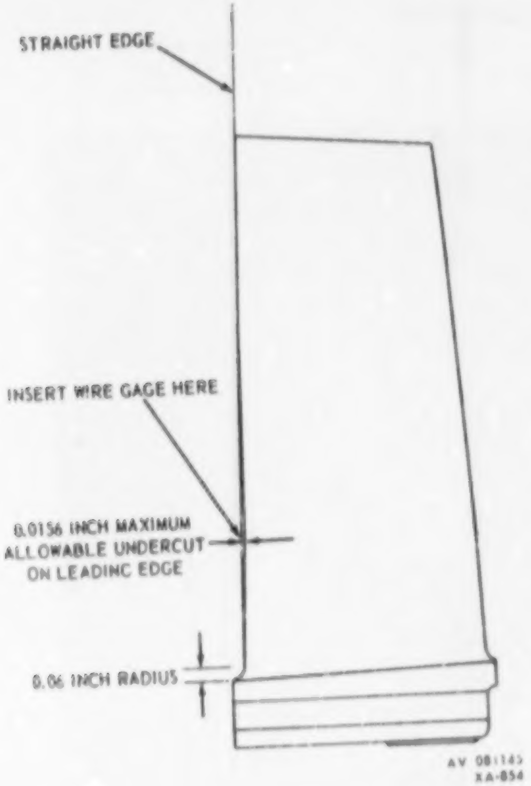

STRAIGHT EDGE
INSERT WIRE GAGE HERE
0.0156 INCH MAXIMUM ALLOWABLE UNDERCUT ON LEADING EDGE
0.06 INCH RADIUS
AV 081145
XA-854

Figure 7-58B. Measuring Erosion Undercutting of First Stage Compressor Rotor Blade

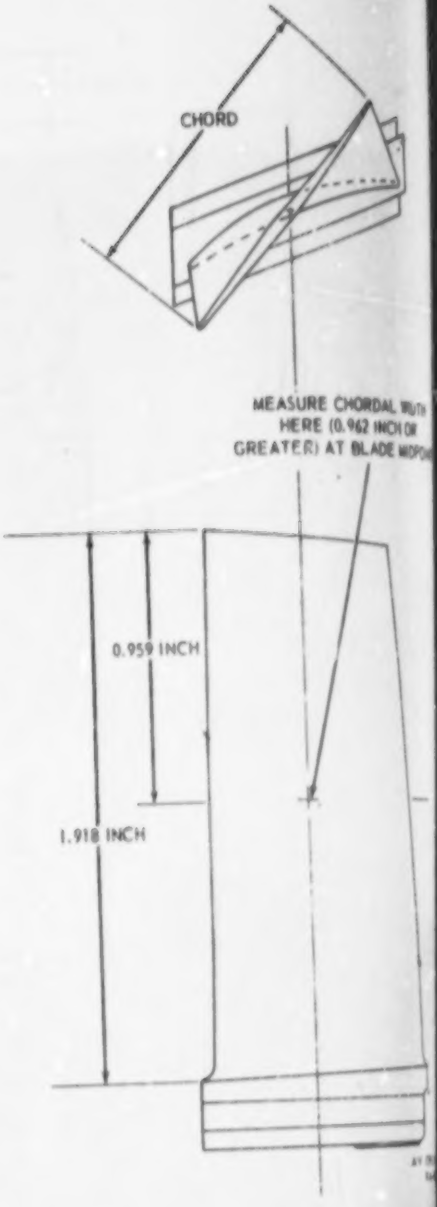
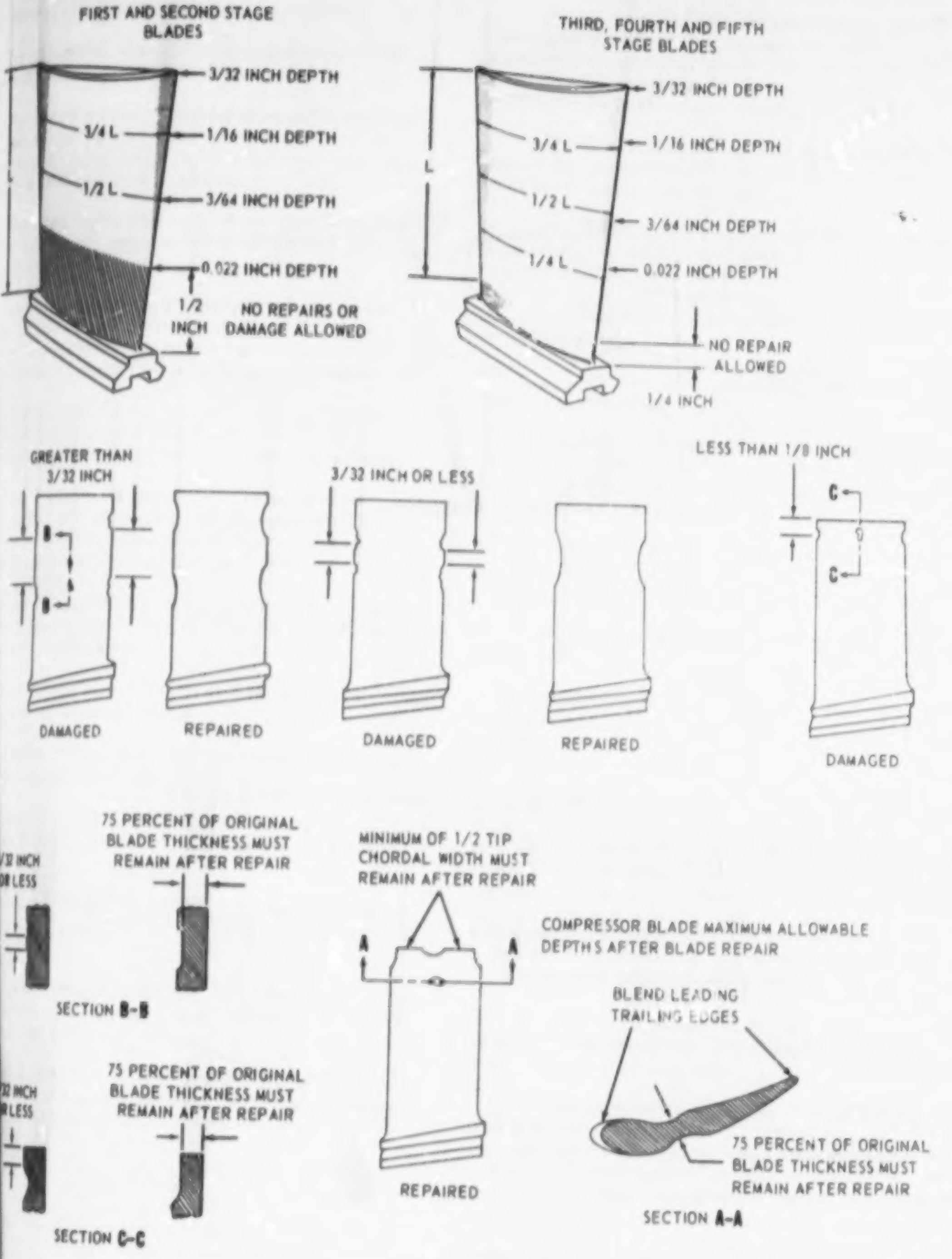

CHORD
MEASURE CHORDAL WIDTH HERE (0.962 INCH OR GREATER) AT BLADE MIDPO
0.959 INCH
1.918 INCH

Figure 7-58C. Measuring Chordal Width of First Stage Compressor Rotor Blade


FIRST AND SECOND STAGE BLADES
3/32 INCH DEPTH
3/4 L
1/16 INCH DEPTH
1/2 L
3/64 INCH DEPTH
0.022 INCH DEPTH
1/2 INCH
NO REPAIRS OR DAMAGE ALLOWED
THIRD, FOURTH AND FIFTH STAGE BLADES
3/32 INCH DEPTH
3/4 L
1/16 INCH DEPTH
L
1/2 L
3/64 INCH DEPTH
1/4 L
0.022 INCH DEPTH
NO REPAIR ALLOWED
1/4 INCH
GREATER THAN 3/32 INCH
B
B
DAMAGED
REPAIRED
3/32 INCH OR LESS
DAMAGED
REPAIRED
LESS THAN 1/8 INCH
C
C
DAMAGED
/32 INCH OR LESS
75 PERCENT OF ORIGINAL BLADE THICKNESS MUST REMAIN AFTER REPAIR
SECTION B-B
MINIMUM OF 1/2 TIP CHORDAL WIDTH MUST REMAIN AFTER REPAIR
A
A
REPAIRED
COMPRESSOR BLADE MAXIMUM ALLOWABLE DEPTHS AFTER BLADE REPAIR
BLEND LEADING TRAILING EDGES
75 PERCENT OF ORIGINAL BLADE THICKNESS MUST REMAIN AFTER REPAIR
SECTION A-A
32 INCH LESS
75 PERCENT OF ORIGINAL BLADE THICKNESS MUST REMAIN AFTER REPAIR
SECTION C-C

ure 7-59. Compressor Rotor Blade Damage - Before and After Repair (All Stages) (T53-L-15/701)

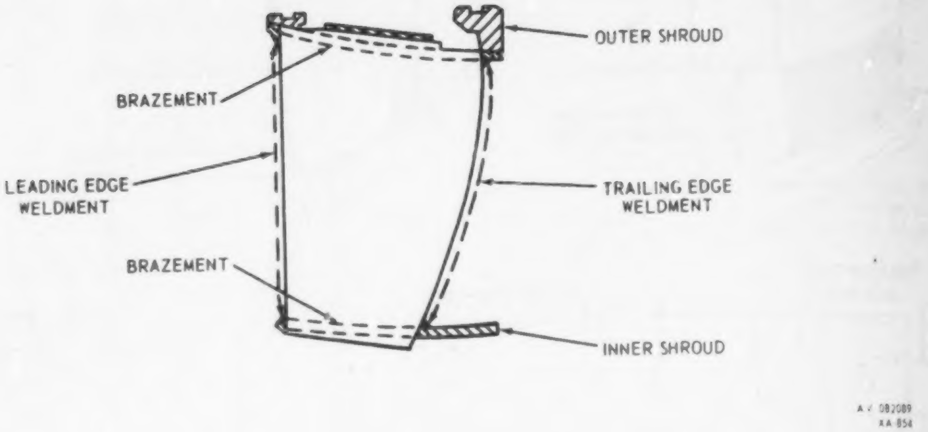

OUTER SHROUD
BRAZEMENT
LEADING EDGE WELDMENT
TRAILING EDGE WELDMENT
BRAZEMENT
INNER SHROUD
AV 082089
XA 854

Figure 7-60. Air Inlet Vane Repair Limits (T53-L-7/7A)

7-81. INSPECTION OF VARIABLE INLET GUIDE VANE ASSEMBLY (T53-L-15/701 Engines). Proceed as follows:

a. Initial inspection shall be made by looking into the inlet housing with the aid of a flashlight. Inspect for obvious damage using the following criteria as a guide:

(1) All nicks, pits, and small isolated dents are acceptable.

(2) Slight vane distortion is acceptable provided it does not impair the full opening and closing of the vanes and does not exist on more than five vanes. Distortion or bowing causing more than 1/8 inch deflection is unacceptable and shall be reworked.

(3) Cracks in other than vane brazement areas are not acceptable. (For typical acceptable cracks see figure 7-61.)

(4) Tears or converging or breached (open) cracks, irreparable distortion, severe bowing, mutilation, and inability to move vanes or mechanism stiffness are all unacceptable and require assembly replacement.

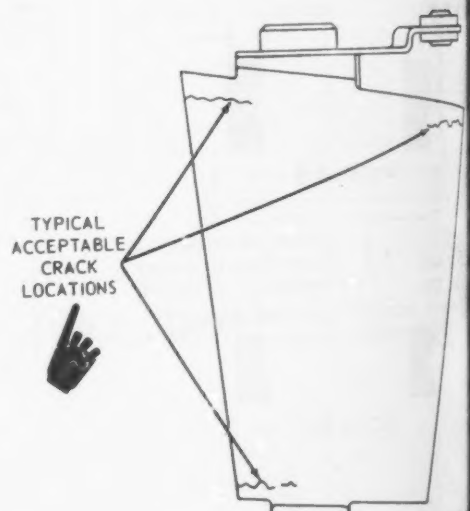

TYPICAL ACCEPTABLE CRACK LOCATIONS

Figure 7-61. Variable Inlet Guide Vane - Typical Acceptable Crack Locations (T53-L-15/701)

b. Perform extended inspection as follows:

(1) If further inspection is required, remove mpressor housing upper or lower half.

(2) If compressor housing removal is imprac- al, further investigation of vane defects can be complished, using a boroscope (National Electric strument Division or equivalent).

c. Distorted vanes can be cold-straightened pro- ded no cracks are generated by the repair. Refer paragraph 7-180.

d. Inspect brazed area of vanes where end caps the airfoil halves for brazement voids. This dition is acceptable provided loss of brazement not caused a separation of mating surfaces.

2. INSPECTION OF STARTER PUMP COVER D POWER TAKEOFF OIL SUPPLY NOZZLE EMBLY.

(See figure 6-29.) Proceed as follows:

a. Inspect starter pump cover (3) for cracks, ks, burrs, and scratches. Replace cracked starter p cover. Blend-repair nicks, burrs, and atches as outlined in paragraph 7-136.

b. Inspect filter (7) for cracks, crossed, or dam- d threads. Replace filter if cracked or if threads crossed or damaged.

c. Inspect filter (7) for cuts and dents. Blend repair tlined in paragraph 7-136.

3. INSPECTION OF INLET HOUSING ASSEMBLY.

figure 6-29.) Proceed as follows:

Inspect studs on inlet housing for broken, sed, or damaged threads. Repair as outlined in graph 7-138.

Inspect all other threaded parts for crossed or ged threads. Repair as outlined in paragraph 7.

Inspect all mating flanges, inlet and strut areas, ounting pads for corrosion. Observe the follow- epair limitations.

(1) Corrosion, including light pitting to a depth 020 inch without breakthrough or causing external ge, is acceptable after repair. Proceed as s:

CAUTION

Use care when brushing with fiber brush so as not to mar finish of nonaffected surrounding parts.

(a) Refinish according to steps aA. through paragraph 7-143.

(b) Complete refinishing according to step aragraph 7-143.

(2) Corrosion, with pitting greater than 0.020 inch in depth but not causing external leakage or possibility of material fallout, should be repaired according to paragraph 7-143 instructions but using Preferred Method - epoxy sealant application.

(3) Corrosion, creating external leakage or a possibility of material fallout, is nonrepairable and is cause for part replacement.

(4) All corrosive pitting on the outer mounting flange is acceptable provided there is no functional interference with the mating part.

(a) Refinish according to steps a. through e. of paragraph 7-143.

(b) Complete refinishing according to step i. of paragraph 7-143.

7-84. INSPECTION OF STARTING FUEL HOSES (T53-L-7/7A Engines).

(See figure 5-3.) Inspect hoses as outlined in paragraph 7-32. Repair hoses as outlined in paragraph 7-145.

7-85. INSPECTION OF STARTING FUEL HOSES AND CHECK FILTER VALVE. (T53-L-15/701 Engines).

Proceed as follows: (See figure 5-4.)

a. Inspect hose assemblies as outlined in paragraph 7-32.

b. Inspect check filter valve for crossed or damaged threads. Repair minor thread damage on valve as outlined in paragraph 7-137. Replace valve if other damage is noted.

c. If during inspection of starting fuel nozzles (paragraph 7-92), heavy coking with clogging is evident, apply light air pressure to the air side of valve in the direction of the flow arrow. If flow is not restricted, valve is acceptable for further use, provided check valve closes when light air pressure is applied to the opposite end.

d. (Deleted)

7-85A. INSPECTION OF BRACKET AND CLAMP ASSEMBLY (T53-L-15/701 Engines).

(See figure 5-4A.) Proceed as follows:

a. Visually and dye-penetrant inspect bracket and clamp assembly (4, figure 5-4A) for cracking in, and adjacent to, welded joints. (Refer to paragraph 7-29.)

b. Weld-repair cracks in and adjacent to welded joints in bracket and clamp assembly, using welding wire (item 121, table 2-2), as outlined in paragraph 7-139.

7-86. INSPECTION OF STARTING FUEL SOLENOID VALVE.

(See figure 5-3.) Proceed as follows:

a. Inspect electrical connector on solenoid valve for corrosion, damaged threads, cracked insulator, and bent or broken pins.

b. Inspect screen on inlet port of solenoid valve to ensure that screen has been thoroughly cleaned and mesh is not damaged. Replace screen if damaged.

c. Inspect inlet port union for damaged threads.

d. Remove corrosion with crocus cloth (item 23, table 2-2) and drycleaning solvent (item 28, table 2-2).

e. Blend-repair minor thread damage on electrical connector.

f. Replace solenoid valve if insulator is cracked or pins are bent or broken.

g. Replace inlet port union if threads are damaged. Replace packing and install union.

h. Replace solenoid valve if thread damage on electrical connector cannot be repaired.

7-87. INSPECTION OF MAIN FUEL HOSES. (See figures 5-5 and 5-7.) Inspect hoses as outlined in paragraph 7-32. Repair hoses as outlined in paragraph 7-145.

7-88. INSPECTION OF TORQUE LIMITER TUBE ASSEMBLY (T53-L-15 Engine). (See figure 5-8.) Inspect torque limiter tube assembly as outlined in paragraph 7-32.

7-89. INSPECTION OF STARTING FUEL MANIFO (See figure 5-10.) Inspect manifolds for breaks, cracks, damaged connectors, and other conditions that would make manifolds unsatisfactory for furthe use. Replace manifolds that are damaged or show evidence of clogging.

a. (Deleted)

b. (Deleted)

c. (Deleted)

0. INSPECTION OF STARTING FUEL NOZZLES 3-L-7/7A Engines) (ORGANIZATIONAL MAINTE- NCE). (See figure 5-9.) Inspect nozzles for clog- g. Replace nozzles that are clogged and cannot be d thoroughly.

1. INSPECTION OF STARTING FUEL NOZZLES 3-L-7/7A Engines) (DS AND GS MAINTENANCE). figure 5-9.) Proceed as follows:

NOTE

ight nicks, dents, or scratches in the per and lower 10 percent of the cone portion of the nozzle retainer (1, figure 6-30) are acceptable. The cone is defined as the retainer inlet section forward of the threads to which the starting fuel manifold attaches.

a. Using 8- or 15-power magnifying glass ex- e each part for nicks, pits, scratches, galling, ness, and wear.

b. (Deleted)

c. Using micrometer, check largest OD of nozzle subassembly (13, figure 6-30). Replace sub- mbly if OD is not within 0.432 to 0.442 inch.

. Inspect threaded areas for damaged or crossed ds.

NOTE

If either part of the metering set (12 and 13, figure 6-30) requires replacement, replace entire set.

. Repair of starting fuel nozzle assembly is lim- o replacement of component parts.

. INSPECTION OF STARTING FUEL NOZZLES -L-15/701 Engines). (See figure 5-10.) Inspect g fuel nozzles for heavy coking, clogging, or e. If nozzle is damaged or is heavily coked, ging cannot be removed, replace.

. INSPECTION OF FLOW DIVIDER AND DUMP E HOSES (T53-L-15/701 Engines.) (See figure) Inspect hose assemblies as outlined in para- 7-32. Repair hoses as outlined in paragraph

INSPECTION OF FLOW DIVIDER AND DUMP E ASSEMBLY (T53-L-15/701 Engines) (OR- ZATIONAL MAINTENANCE). (See figure 5-11.) d as follows:

NOTE

Inspect flow divider while it is installed.

a. Inspect flow divider for leakage. Replace flow divider if leakage is noted.

b. Inspect flow divider for damage. Replace flow divider if damage is noted.

7-95. INSPECTION OF FLOW DIVIDER AND DUMP VALVE ASSEMBLY (T53-L-15/701 Engines) (DS AND GS MAINTENANCE). (See figure 5-11.) Proceed as follows:

a. Inspect all parts for nicks, burrs, and scratches. Blend-repair nicks, burrs, and scratches as outlined in paragraph 7-136.

b. Inspect all threaded parts for damaged threads. Repair damaged threads as outlined in paragraph 7-138.

c. Visually inspect all parts for cracks, distortion, and excessive wear. Replace parts with these defects.

7-96. INSPECTION OF COMBUSTION CHAMBER DRAIN VALVE ASSEMBLY (ORGANIZATIONAL MAINTENANCE). Proceed as follows:

a. Inspect mounting flange for warpage and cracks. Replace valve if warpage or cracks are noted.

b. Check functioning of valve by depressing plate. If plate does not return to original position, reclean or replace valve.

c. Inspect for damaged threads. Replace valve if threads are damaged.

d. Inspect for clogging of outlet. Reclean if necessary.

7-97. INSPECTION OF COMBUSTION CHAMBER DRAIN VALVE ASSEMBLY (DS AND GS MAINTENANCE). (See figure 6-32.) Proceed as follows:

a. Inspect plate (1) and body (3 or 5) for nicks, burrs, and scratches. Blend-repair nicks, burrs, and scratches in body as outlined in paragraph 7-136. Replace plate if damaged.

b. Inspect body (3 or 5) for damaged threads. Repair damaged threads as outlined in paragraph 7-138. Replace body if threads are damaged beyond repair.

c. Visually inspect all parts for cracks, distortion, and excessive wear. Replace all cracked, distorted, or excessively worn parts.

7-98. INSPECTION OF MAIN FUEL MANIFOLDS (T53-L-7/7A Engines). Proceed as follows:

a. Inspect main fuel manifolds for nicks and burrs. Blend repair nicks and burrs as outlined in paragraph 7-136.

b. Inspect manifolds for breaks, cracks, damaged connectors, and other conditions that would make manifolds unsatisfactory for further use. Replace manifolds that are damaged or show evidence of clogging.

7-99. INSPECTION OF MAIN FUEL MANIFOLDS (T53-L-15/701 Engines). Proceed as follows:

NOTE

Inspect fuel manifold while it is installed.

a. Inspect fuel manifold for leakage. Replace if leakage is noted.

b. Inspect fuel manifold for cracks or damage. Replace if cracks or damage are noted.

c. Inspect main fuel nozzles for chafing or excessive coke buildup. Limits are as follows: (See figure 7-62.)

(1) Chafing or rub damage in front of air-inlet holes is acceptable provided air shroud is not broken through.

(2) Any evidence of crushing at air-inlet holes is unacceptable.

(3) Evidence of heavy coking at the nozzle fuel orifice outlet or at air-inlet holes is unacceptable. Coke buildup on the face of the air shroud is acceptable provided it does not extend into the shroud.

(4) Inspect nozzles for proper torque (50 to 75 pound-inches).

(5) Replace manifold half if coke buildup or chafing is excessive.

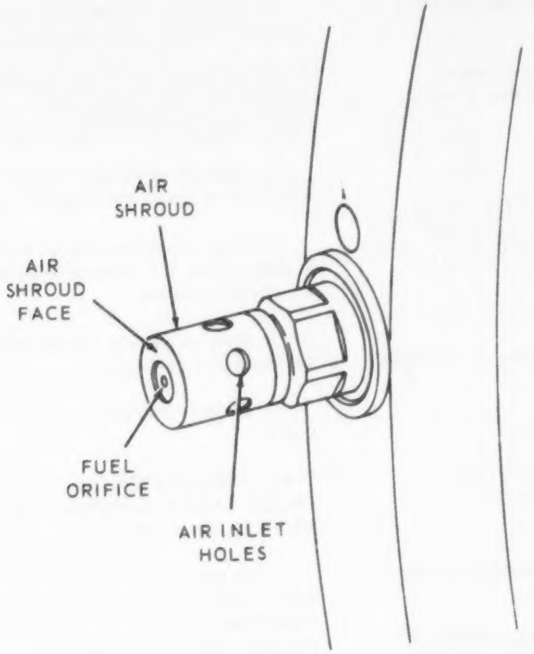


Figure 7-62. Main Fuel Nozzle - Inspection (T53-L-15/701)

7-100. INSPECTION OF FUEL FILTER AND HEATER BRACKET ASSEMBLY. Proceed as follows:

a. Visually inspect bracket, connecting tube, and all attaching parts for damage.

b. Inspect connecting tube for leaks.

c. Replace damaged parts.

d. Replace connecting tube if leaks are noted.

7-101. INSPECTION OF FUEL HEATER. Proceed as follows:

a. Visually inspect fuel heater for cracks, breaks, dents, or other damage.

b. Inspect heater for leaks.

c. Replace heater if damage or leaks are found.

7-102. INSPECTION OF MAIN FUEL FILTER ASSEMBLY, P/N 123998 AND P/N 045468, (DS AND GS MAINTENANCE). Proceed as follows:

a. Clean all parts as outlined in paragraph 5-55.

b. Inspect all passages for blockage. Remove blockage by flushing with clean fuel (item 47, table 2-2). Air dry.

c. Inspect all parts for cracks, dents, and other damage.

d. Inspect threaded parts for thread damage.

e. Inspect all parts for damage that would prevent proper functioning of main fuel filter assembly.

f. Replace all damaged parts.

NOTE

The main filter element in either filter should be replaced if removed. (Refer to paragraph 5-55 for kit numbers and replacement parts.)

7-103. INSPECTION OF FUEL CONTROL AIR PRESSURE SENSING HOSE ASSEMBLY. Inspect hose as outlined in paragraph 7-32.

7-104. INSPECTION OF FUEL CONTROL TORQUE LIMITER (T53-L-15 Engine). Proceed as follows:

CAUTION

Do not remove torque limiter from fuel regulator housing except for replacement.

a. Inspect for minor thread damage on screws and connectors.

b. Repair as outlined in paragraph 7-138.

7-105. INSPECTION OF FUEL CONTROL SOLENOID VALVE (T53-L-7/7A Engines). (See figure 5-20.) Proceed as follows:

a. Inspect electrical connector on solenoid valve for corrosion, damaged threads, cracked insulator, and bent or broken pins.

b. Inspect solenoid (24) and solenoid support bracket (13) for cracks or breaks.

c. Inspect insert (23) and valve and sleeve assembly (22) for damage.

d. Remove corrosion with crocus cloth (item 23, table 2-2) and drycleaning solvent (item 28, table 2-2).

e. Repair minor thread damage on electrical connector as outlined in paragraph 7-138.

f. Replace solenoid or bracket if cracks or breaks are noted.

g. Replace solenoid if insulator is cracked or if pins are bent or broken.

7-106. INSPECTION OF TOPPING GOVERNOR. Proceed as follows:

a. Inspect governor for corrosion and contamination.

NOTE

Corrosion is a rust-like deposit on the surface of internal parts that are exposed when fuel regulator and topping governor are separated. Contamination is any foreign matter found in fuel or clinging to surfaces of internal parts that are exposed when fuel regulator and topping governor are separated.

b. Inspect all exposed parts for wear and damage.

c. If corrosion is found, replace governor assembly.

d. If contamination is found, flush governor and regulator.

e. Pour clean fuel (item 47, table 2-2) into topping governor through openings in the surface that mates with the fuel regulator.

f. Shake components by hand for 10 to 15 seconds.

g. Pour flushing fuel from governor into clean container. Check for contamination in fuel.

NOTE

Discard contaminated fuel and thoroughly clean containers after each flushing.

h. Flush governor five times. Replace governor if it cannot be flushed clean in five attempts.

i. Remove pump discharge strainer from fuel regulator. Clean strainers and reinstall or replace, as necessary.

j. If exposed parts are damaged or excessively worn, replace topping governor and/or fuel control as required.

7-107. INSPECTION OF FUEL CONTROL. Proceed as follows:

a. Inspect all fittings for damaged or crossed threads. Repair threads as outlined in paragraph 7-138.

b. Inspect fuel control drive shaft for chipped or worn splines, as follows, and replace defective parts.

(1) Thoroughly clean drive gearshaft with drycleaning solvent (item 28, table 2-2).

(2) Inspect fuel control drive gearshaft male splines for wear by measuring over 0.120 inch diameter wires as indicated in figure 7-63.

(3) If measurement over wire is less than 0.7950 inch, replace fuel control drive gearshaft.

NOTE

In following step c., it is not necessary to remove or lock the gearshaft for inspection purposes.

c. Inspect female spline of accessory drive gearshaft, as follows, and replace defective parts.

(1) Clean female spline using a fiber brush (one inch diameter round) and drycleaning solvent (item 28, table 2-2). Dry with compressed air.

(2) Visually or by using a sharp instrument (probe or pick), inspect spline teeth for worn area.

NOTE

Any wear on the fuel control drive splines or the mating gear splines that indicate a definite wear pattern, or a ridge resulting from material removal is cause for rejection. Any splines that show just a shiny area is acceptable.

(3) Replace if wear is evident on accessory driv gearshaft.

NOTE

Do not use any grease on the Fuel Control Splines upon installation of the fuel control.

d. Inspect mounting flange for elongated mountin holes and warpage. Replace control if defective.

e. Inspect solenoid valve for security of mountin bent or broken contact pins, and damaged insulator. If mounting is loose, tighten. If contact pins are bent or broken, replace solenoid valve. (Refer to paragraphs 5-17 through 5-20.)

f. Inspect temperature-sensing assembly housin for cracks, warpage, and elongation of mount holes. Replace housing if defective.

g. Inspect temperature-sensing tube and shieldin for security of installation, dents, and sharp bends. Replace fuel control if defective.

gA. Inspect temperature-sensing tube and shielding for cracks. Crack limits are as follows:

(1) Cracks that are not a result of the shieldi being crushed are allowed.

(2) Cracks that do not chafe or cut into the tube, creating the possibility of a rupture, are allo

NOTE

Rupture of the tube will be readily discernible by the odor caused by leaking fluid contained in the tube. Also, engine surge problems will be encountered.

(3) Cracks that do not result in circumferent separation of the shielding, allowing a twist or shar bend in the tube and possible tube rupture, are allowed.

gB. Replace fuel control if crack limits are exc ed or if temperature-sensing tube is leaking.

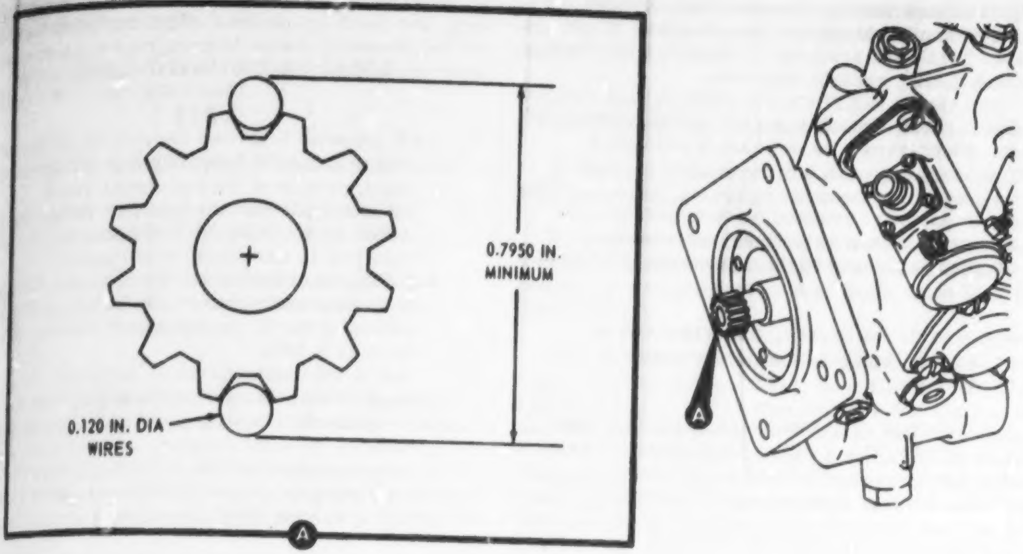


Figure 7-63. Measurement of Gearshaft Spline Wear

h. Inspect topping governor for security of install- tion. (Refer to paragraph 7-106.)

i. If overspeed governor is removed, inspect fuel ntrol for corrosion or contamination. If corrosion found, replace fuel control. If contamination is nd, flush fuel control.

NOTE

Corrosion is a rust-like deposit on surface of internal parts that are exposed when main fuel regulator and topping governor are separated. (Refer to paragraph 5-74 or 5-76.) Contamination is any foreign matter found in fuel or clinging to surfaces of internal parts that are exposed when main fuel regulator and topping governor are separated.

108. INSPECTION OF LUBRICATION PRESSURE NIFOLD, PRESSURE HOSES, AND SCAVENGE SES.

Proceed as follows:

a. Inspect hoses for damage as outlined in para- ph 7-32. Repair or replace damaged hoses as lined in paragraph 7-145.

b. Inspect pressure manifold for cracks. Replace ifold if cracks are noted.

c. Inspect manifold connectors for damaged ads. Repair damaged threads as outlined in graph 7-138. Replace manifold if threads are aged beyond repair.

9. INSPECTION OF TORQUE LIMITER MANI- D ASSEMBLY (T53-L-15 Engine).

Proceed as ws:

a. Inspect manifold for cracks. Replace manifold if cracks are noted.

b. Inspect manifold connectors for damaged threads. Repair damaged threads as outlined in paragraph 7-138. Replace manifold if threads are damaged beyond repair.

7-110. INSPECTION OF POWER-DRIVEN ROTARY (OIL) PUMP.

Proceed as follows:

NOTE

If pump is to be replaced, remove and retain temperature bulb for installation into new pump.

a. Inspect power-driven rotary (oil) pump for damaged threads and cracked flanges. If damaged, replace pump.

b. Inspect power-driven rotary (oil) pump drive shaft assembly (10, figure 5-53) for damaged splines. Replace drive shaft assembly if splines are damaged.

7-111. INSPECTION OF LUBE OIL FILTER ASSEMBLY.

Proceed as follows:

a. Inspect filter cover assembly (14, figure 6-35) for contamination. If an excessive amount of chips is noted (refer to paragraph 4-6), clean filter elements. (Refer to paragraph 7-16.)

b. Inspect filter elements for damage. Replace damaged elements.

c. Inspect bolt and housing for damage. Replace parts if defective.

d. If cover assembly is disassembled for any reason, measure thickness of filter elements at inner ring. Thickness shall be 0. 122 to 0. 138 inch. If not within limits, replace elements.

e. Inspect filter assembly for nicks, burrs, and scratches. Blend-repair as outlined in paragraph 7-136.

f. Inspect parts for crossed or damaged threads. Repair damaged threads as outlined in paragraph 7-137. Replace parts having threads damaged beyond repair.

g. Inspect parts for cracks, distortion and excessive wear. Replace all cracked, worn or excessively worn parts.

7-112. INSPECTION OF POWER-DRIVEN ROTARY (BOOSTER) PUMP (T53-L-7/7A/15 Engines). Inspect housing for damage and splined shaft for worn or chipped teeth. Replace rotary pump if damaged.

7-113. INSPECTION OF CHIP DETECTOR. Proceed as follows:

a. Inspect chip detector for metallic chips. (Refer to paragraph 4-6.)

b. Inspect chip detector for stripped and/or damaged threads. Replace if threads are stripped or damaged.

7-114. INSPECTION OF EXHAUST THERMOCOUPLE ASSEMBLY. Proceed as follows:

CAUTION

Extreme caution shall be taken when handling the thermocouple assembly. Excessive flexing of the assembly, specifically at the probe locations, can result in internal breakage and shorting. Never use pliers or sharp objects on probes or adjacent harness.

a. Inspect thermocouple harness for wear, fraying, and loose connectors. Perform a functional test of the assembly (refer to paragraph 8-31) to ensure absence of shorting and internal damage.

NOTE

A thermocouple assembly that fulfills requirements of the functional check but has chafe damage (not exceeding limits shown in figure 7-64) may be repaired as instructed in paragraph 7-184. Assemblies having damage exceeding such limits must be replaced (refer to paragraphs 5-117 through 5-120).

b. Inspect connector for damaged threads and cracked insulator. Replace damaged thermocouple.

c. Inspect connector for corrosion. Remove corrosion using crocus cloth (item 23, table 2-1) drycleaning solvent (item 28, table 2-2).

d. Check six-probe exhaust thermocouple asse bly (1, figure 5-62) for continuity, using Multimete P/N AN/PSM6B. Resistance shall be 1. 40 ± 0. 14 ohms at 68 °F soak temperature. For other ambie temperatures see figure 4-4. If resistance is not plus or minus ten percent of value shown in figure 4-4, replace thermocouple assembly.

e. Check three-probe exhaust thermocouple ha ness (2, figure 5-61) for continuity, using Multim P/N AN/PSM6B, or equivalent. Resistance shall 0. 458 ohms ± 0. 045 ohms at 68 °F soak temperat for P/N 5469087G4 and P/N 5469087G5. Resistanc shall be 1. 17 ohms ± 0. 11 ohms at 68 °F soak tem perature for P/N TH-34642. For other ambient temperatures see figure 4-3. If resistance is not plus or minus ten percent of value shown in figure 4-3, replace thermocouple assembly.

Figure 7-65 deleted.

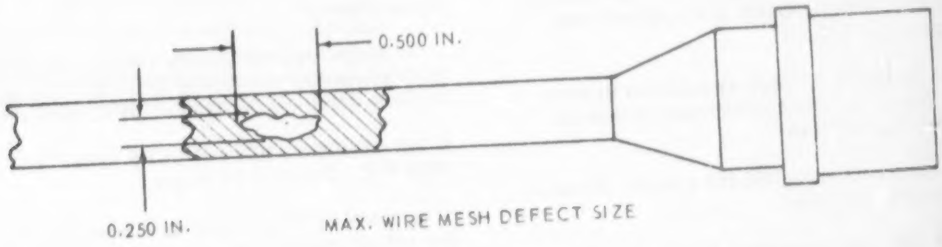


Figure 7-64. Exhaust Thermocouple Assembly - Chafing and Fraying Inspection

i. Inspect thermocouple probes for bending. Re-
e damaged thermocouple.

115. INSPECTION OF ELECTRICAL CABLE MBLY. Proceed as follows:

a. Inspect connectors for damaged threads. Re-
damaged threads as outlined in paragraph 7-138.

b. Inspect connectors for corrosion. Remove
rosion with crocus cloth (item 23, table 2-2).

c. Inspect connectors for cracked insulators and
or broken pins. Replace cable assembly if in-
tors or pins are defective.

Inspect electrical cable assembly for loose
ectors, chafing, and fraying. Minor chafing or
g is acceptable following repair. Severe
g is unacceptable. Repair minor or localized
g with chafing sleeve. (Refer to paragraph
.) Cable distortion that does not break the
or impair operation is allowable.

Perform continuity check on cable assembly.
e cable assembly if defective.

INSPECTION OF ELECTRICAL TORQUE- R JUNCTION BOX ASSEMBLY (T53-L-701). Proceed as follows:

Inspect for damaged threads. Repair damaged
s as outlined in paragraph 7-138. Ship engine
t for replacement of torquemeter junction box
ds are damaged beyond repair.

b. Inspect junction box for minor surface scratches, small nicks, burrs, and dents. Blend-repair as outlined in paragraph 7-136.

7-117. INSPECTION OF IGNITION LEAD AND COIL ASSEMBLY. Proceed as follows:

a. Inspect connectors for damaged threads. Repair damaged threads as outlined in paragraph 7-138.

b. Inspect connectors for broken or cracked ceramic insulators and damaged or missing springs. Repair or replace parts using parts from kit, P/N 10-88584-10.

bA. Inspect connectors for wear, cracks, or damaged lockwire holes. Wear, to the extent of causing clearance up to 0.032 inch between ferrule and connector, is acceptable. One crack, not exceeding 0.0937 inch in length in each connector, is acceptable. Replace ignition lead and coil assembly damaged beyond such limits. Also, replace ignition lead and coil assembly if connector lockwire holes are pulled out.

c. Inspect leads for chafing, fraying, and cracks. Minor chafing or fraying is acceptable following repair. Cracking or severe fraying is unacceptable. Repair minor or localized fraying with chafing sleeve. (Refer to table 7-7). Cable distortion that does not break the braid or impair operation is allowable.

7-118. INSPECTION OF IGNITION UNIT. (See figures 5-68 and 5-69.) Proceed as follows:

Table 7-7. Chafing Sleeve Specifications

HOSE SIZE	SPIRAL CONSTANT	CHAFING SLEEVE
-3	1.2	P/N 94835-1
-4	1.5	
-5	1.8	
-6	2.1	
-8	1.7	P/N 94835-2
-10	2.0	
-12	2.4	
-16	2.4	P/N 94835-3
-20	2.9	
-24	3.6	
EXAMPLE: To determine the proper length of spiral sleeve required to cover a 6 inch length of -5 hose, multiply the hose length (6 inches) by the spiral constant (1.8). The sleeve length is the product of these two (6 x 1.8 = 10 inches) using the P/N 94835-1 sleeve.		

WARNING

On T53-L-7 engines, the ignition unit contains a very small amount of radioactive material (Cesium-Barium 137) and normally requires no handling precautions. However, severly damaged units that have been broken open must be handled with forceps or lead gloves and disposed of in accordance with AR 755-25 and TB 55-1500-314-25.

a. Inspect connector on ignition unit for corrosion. Remove corrosion with crocus cloth (item 23, table 2-2) and drycleaning solvent (item 28, table 2-2).

b. Inspect connector for damaged threads. Repair minor thread damage as outlined in paragraph 7-138. Replace ignition unit if threads cannot be repaired.

c. Inspect connector for cracked insulator and bent or broken pins. Replace ignition unit if insulator is cracked or pins are bent or broken.

d. Inspect mounting bracket for cracks. Replace bracket if defective.

7-119. INSPECTION OF IGNITER PLUGS (ORGANIZATIONAL MAINTENANCE).

(See figures 5-67 and 5-68.) Proceed as follows:

a. Visually inspect ceramic surface of igniter plug. Replace plug if surface is granular or chi or if other defects are evident.

b. Inspect shank for fretting condition. Repla plug if fretting is evident.

c. Igniter plugs are not cleaned at this level maintenance. If plugs are dirty and carbonized, replace.

7-120. INSPECTION OF IGNITER PLUGS (T53- 7/7A Engines) (DS AND GS MAINTENANCE).

Pr as follows:

a. Inspect igniter plugs for crossed or stripp threads. Replace plugs if defective.

b. Visually inspect igniter plug gap surface material. Replace plug if surface is granular or chipped or if other damage is evident.

c. Inspect shank for fretting condition. Repla plug if fretting is evident.

7-121. INSPECTION OF IGNITER PLUGS (T53- 15/701 Engines) (DS AND GS MAINTENANCE).

ceed as follows:

a. Inspect igniter plug for crossed or stripped ads and broken or chipped insulation at connector d. Replace plug if defective.

b. Inspect igniter plug for chafing or grooving in ing area. Grooving and wear are allowable pro- d that depth of grooves does not exceed 0.020 inch. e figure 7-66.) Replace plug if limit is exceeded.

c. Inspect semiconductor at electrode end for sion and chipping. Erosion and chipping are ac- ptable, providing plug functions normally. (See re 7-67.)

d. Inspect electrode for burning and erosion. r burning (discoloration) and slight eroding y of electrode is acceptable. Replace plugs that it burned-off or heavily eroded electrode. (See re 7-67.)

INSPECTION OF OIL TEMPERATURE
a. Inspect oil temperature bulb for damaged ads, bent or broken pin, and bent probe. Replace if damage is noted.

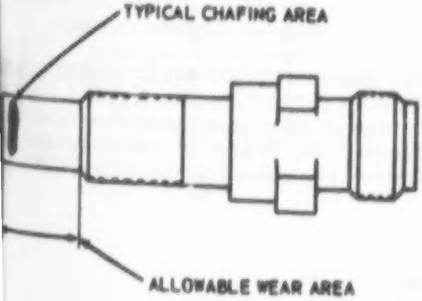
INSPECTION OF HOT-AIR SOLENOID VALVE AIR REGULATOR TUBE. Proceed as follows:

a. Inspect electrical connector on hot-air solenoid for corrosion. Remove corrosion with crocus (item 23, table 2-2) and drycleaning solvent 28, table 2-2). Do not submerge valve in clean- solvent.

b. Inspect electrical connector for damaged ds. Repair minor thread damage as outlined in graph 7-138. Replace valve if threads cannot be ired.

c. Inspect electrical connector for cracked insula- nd bent or broken pins. Replace solenoid valve lator is cracked or pins are bent or broken.

d. Inspect air regulator tube for cracks. Replace f cracks are found.



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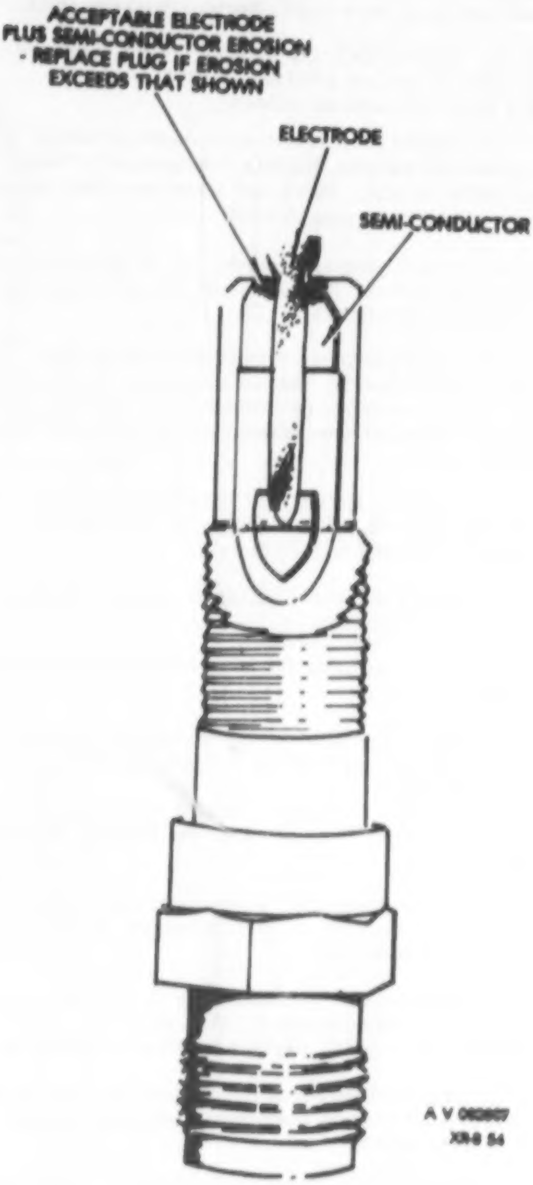
ure 7-66. Igniter Plug Inspection Areas (T53-L-15/701)


ACCEPTABLE ELECTRODE PLUS SEMI-CONDUCTOR EROSION - REPLACE PLUG IF EROSION EXCEEDS THAT SHOWN
ELECTRODE
SEMI-CONDUCTOR

A V 062607
XR-8 54

Figure 7-67. Igniter Plug Electrode and Semiconductor Inspection Areas (T53-L-15/701)

7-124. INSPECTION OF AIRBLEED CONNECTING MANIFOLD AND ADAPTER (T53-L-7/7A Engines). Inspect manifold and adapter for cracks, warping, and fraying of wire braid. Replace damaged parts.

7-125. INSPECTION OF ELBOW, TUBE, AND AIRBLEED ADAPTER ASSEMBLY (T53-L-15/701 Engines). Proceed as follows:

a. Inspect tube, elbow, and adapter assembly for cracks and warping. Replace damaged parts. Inspect all parts for nicks, burrs, and scratches. Blend repair as outlined in paragraph 7-136.

b. Inspect adapter assembly for stripped and/or damaged threads. Replace screw thread inserts as outlined in paragraph 7-137.

7-126. INSPECTION OF INTERSTAGE BLEED ACTUATOR HOSES. Inspect interstage bleed actuator hose assemblies as outlined in paragraph 7-32. Repair damaged hose assemblies as outlined in paragraph 7-145.

7-127. INSPECTION OF INTERSTAGE BLEED ACTUATOR ASSEMBLY (Organizational Maintenance). Proceed as follows:

a. Inspect actuator housing for cracks. Replace actuator if defective.

b. Inspect actuator for proper functioning during engine operation.

c. Inspect threaded parts for damage, springs for distortion, and rods for bending. Replace damaged parts.

d. Inspect strainer for damage. Replace damaged strainer.

e. Inspect bleed band assembly (1-160-820-01) for worn or elongated captive bushings. Replace bleed band assembly.

f. Inspect bleed band assembly (1-160-820-04) for worn or elongated bushings (15, figure 5-76, or 19 and 20, figure 5-81). Replace bushings if defective.

g. Inspect bleed bands for bending that may cause improper seating on compressor housing. Replace bent bleed bands.

h. Inspect bleed bands for cracks in [illegible]1-to-bushing weld (see figure 7-68) by dye-penetrant method. (Refer to paragraph 7-29.) Blend repair cracks on inside of band that extend up to 0.080 inch into the band (see figure 7-69). Replace bands if cracks extend more than 0.080 inch into band. Reinspect band by dye-penetrant method.

7-128. (Deleted)

7-129. INSPECTION OF INTERSTAGE BLEED ACTUATOR ASSEMBLY (DS AND GS MAINTENANCE). (See figures 6-36, 6-37 and 6-38.) Proceed as fol

a. Inspect all parts for nicks, burrs, and scratche Blend-repair nicks, burrs, and scratches as outlined in paragraph 7-136.

b. Inspect all threaded parts for damaged or crossed threads. Repair damaged threads as outlined in paragraph 7-138. Replace parts having threads damaged beyond repair.

c. Inspect all parts for cracks, bending, distortion, and excessive wear. Replace all cracked, ben distorted, or excessively worn parts.

d. Visually inspect rod end (42, figure 6-38) and rod end bearing (39) for worn or elongated bushings. Replace defective bushings.

e. Visually inspect piston (33, figure 6-37, or 34, figure 6-38) for worn or elongated bushings. Replace defective bushings.

f. Inspect housing and screw assembly (43, figure 6-36 or 36, figure 6-37) or housing assemb (37, figure 6-38) for damaged screw thread inserts. Repair or replace screw thread inserts as outlined in paragraph 7-137.

g. Visually inspect strainer assembly (19) for cuts and dents.

h. Visually inspect seal (33, figure 6-36; 32, figure 6-37; or 33, figure 6-38) and all packings for cuts, tears, and deterioration. Replace defect seal or packings.

i. Visually inspect diaphragm (14) for cuts, tears, and deterioration. Replace defective diaphragm.

j. Inspect all springs for damage. Replace damaged springs.

k. Visually inspect inner wall of housing and screw assembly (45, figure 6-36 or 36, figure 6-3 and housing assembly (37, figure 6-38) for scori in area affected by piston travel. Scoring up to 0.005 inch is acceptable. Scoring beyond 0.005 inch is unacceptable. Replace assembly.

7-130. INSPECTION OF INLET GUIDE VANE AC ATOR HOSES (T53-L-15/701 Engines). Inspect i guide vane actuator hose assemblies as outlined i paragraph 7-32. Repair or replace damaged ho assemblies as outlined in paragraph 7-145.

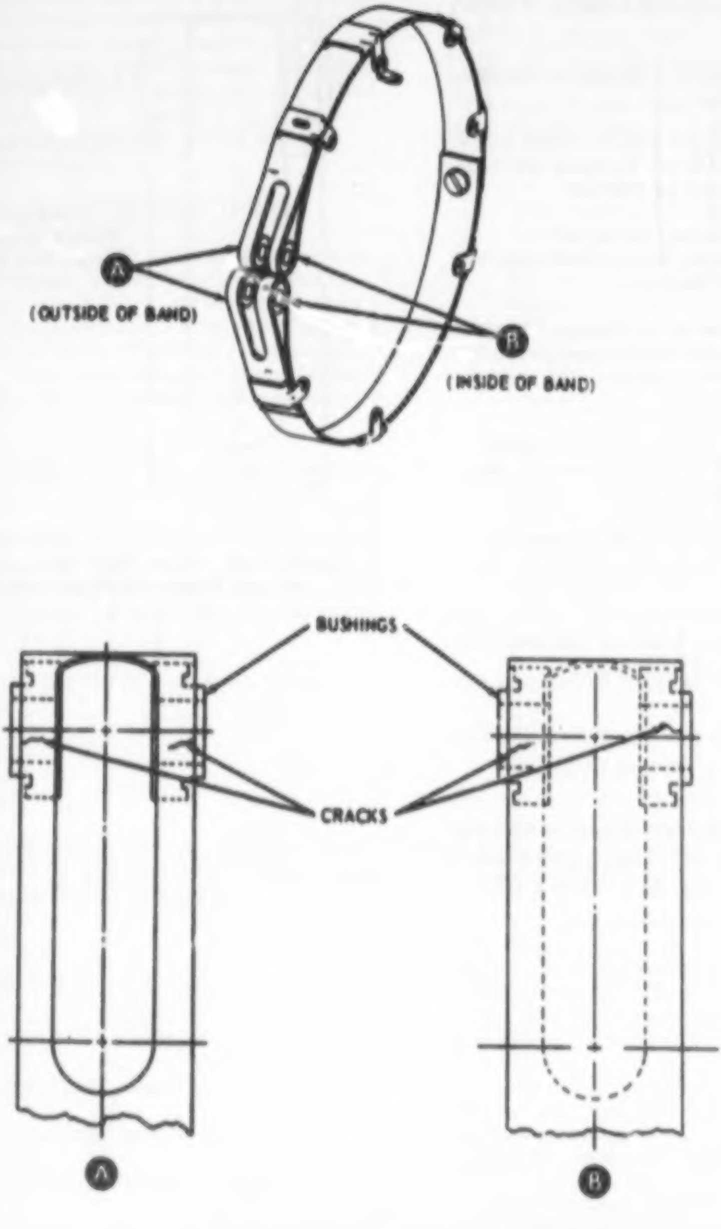

A
(OUTSIDE OF BAND)
B
(INSIDE OF BAND)
BUSHINGS
CRACKS
A
B

Figure 7-68. Bleed Band Crack Locations

7-131. INSPECTION OF INLET GUIDE VANE ACTUATOR ASSEMBLY (T53-L-15/701 Engines) (ORGANIZATIONAL MAINTENANCE). Proceed as follows:

a. Inspect threaded parts for damage or stripped threads. Replace damaged parts.

b. Inspect actuator for cracked flanges. Replace actuator if cracked.

c. Inspect bearing connector retaining screw for tightness and proper staking.

7-132. INSPECTION OF INLET GUIDE VANE ACTUATOR ASSEMBLY (T53-L-15/701 Engines) (DS AND GS MAINTENANCE). Proceed as follows:

a. Inspect all parts for nicks, burrs, and scratches. Blend-repair nicks, burrs, and scratches as outlined in paragraph 7-136.

b. Inspect all threaded parts for damaged threads. Repair damaged threads as outlined in paragraph 7-138. Replace parts having threads damaged beyond repair.

c. Visually inspect all parts for cracks, distortion, and excessive wear. Replace all cracked, distorted, or excessive worn parts.

d. Inspect bearings (1, figure 6-39) for scoring or other damage. Replace damaged bearing as outlined in paragraph 7-183.

e. Inspect for excessive play between feedback control lever and housing (max. is 0.010 inch).

f. Inspect for excessive play in circumferential direction of feedback control lever (max. is 0.030 inch).

g. Inspect for bent actuator lever (measure from tip of housing bottom to center line of bolt hole on feedback control lever (distance may be 3 7/8 to 4 1/8 inch).

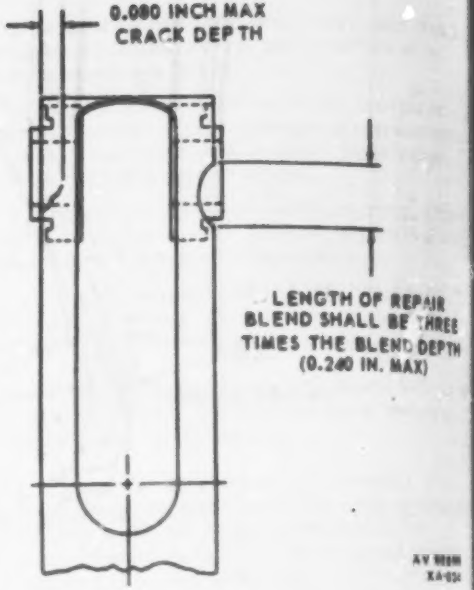

0.080 INCH MAX
CRACK DEPTH
LENGTH OF REPAIR BLEND SHALL BE THREE TIMES THE BLEND DEPTH (0.240 IN. MAX)

Figure 7-69. Bleed Band Maximum Repairable Crack Depth and Repair Dimensions

SECTION III

REPAIR

133. GENERAL.

134. After inspection, repair or replacement may required to restore the engine to a serviceable ndition. Extreme care must be used to ensure cor- ect replacement of parts. Follow repair instructions refully. Fit precision parts and mating parts dur- g repair procedures to ensure matching after re- ir. All uncovered openings shall be sealed with s, plugs, or suitable cover.

135. GENERAL REPAIR INSTRUCTIONS.

136. BLEND REPAIR. The general blend repair ocedure is as follows: Blend repair, using small sinker type files and India or carborundum stones. e crocus cloth (item 23, table 2-2) for final polish- g do not use power tools. Blend all repairs and ish smoothly. Lines, scratches, or sharp edges, ich might cause a concentration of stress, are t permitted.

136A. SILVER-BRAZE REPAIR. Proceed as fol- s:

a. Clean parts, using drycleaning solvent method.

b. Areas to be brazed shall be free of chips, dirt, , and all other foreign material detrimental to the zing operation.

c. Apply brazing flux to the area to be braze- aired as follows:

(1) (Deleted)

(2) (Deleted)

d. Braze parts in accordance with Military Speci- ation MIL-B-7883 by applying brazing alloy, using utral or reducing flame, as follows:

(1) (Deleted)

(2) (Deleted)

e. Remove flux by rinsing with hot water 180°F.

f. Remove excess braze deposits.

g. Inspect repaired area as follows:

(1) Inspect by dye-penetrant method.

(2) Ninety percent fillet is required on side of e applications.

(3) No cracks or voids are allowed in braze of ent base metal.

(4) Surface porosity is acceptable.

(5) Surfaces of parts shall be free of excessive brazing material.

7-137 THREAD REPAIR AND REPLACEMENT OF INSERTS. Inspect studs, threaded inserts, and all internal and external threads for damage or crossed threads. If damage is noted, repair as outlined in Technical Manual TM 55-1500-204-25/1, General Aircraft Maintenance Manual, or as follows.

NOTE

> The preferred method of repairing damaged helical wire inserts or damaged internal threads in hydraulic ports of particular magnesium metal areas on the engine is by use of Rosan inserts.
>
> Following table 7-7A lists Rosan materials and tools applicable to such specific type repairs. Table 7-7B lists related tool sizes and repair dimensions for each repair listed.
>
> The procedural instructions are examples of repair/replacement procedures that may be made, using Rosan inserts.

a. Repair power takeoff pad. (Refer to tables 7-7A and 7-7B.) Proceed as follows:

(1) Select the Rosan insert material, special and common tools listed in tables 7-7A and 7-7B.

(2) Remove old or damaged wire insert.

(3) Step drill the hole with the special Rosan step drill, RCADC38-484, to a depth of between 11/64 to 13/64 inch. Tap the minor diameter hole with the common size tap listed in Repair No. 1, table 7-7B, to a depth of 21/32 inch.

(4) Coat the tapped magnesium threads with zinc-chromate primer (item 128, table 2-2). Initially engage the Rosan insert by hand and then install the drive wrench, R1108-W, onto the insert. Screw the insert into the magnesium to a depth of 0.010 to 0.020 inch below the surface of the material.

(5) Align the OD flat of the lockring nearest the pad surface edge with the least hole edge distance and where serrations of both lockring and insert align. Install the drive tool, R208-D, over the lockring.

(6) Using a hammer, strike the end of the drive tool to drive the lockring into the magnesium parent metal until the lockring is either flush with or to a depth of 0.010 inch below the surface of material.

b. Repair engine mount pad on the inlet housing. (Refer to tables 7-7A and 7-7B.) Proceed as follows:

Table 7-7A. Rosan Insert Materials and Special Tools

LOCATION	INSERT	FSN	LOCKRING	FSN	TOOL	TOOL NUMBER	FSN
Power Takeoff Pad	RJ280SX-10	5340-151-5941	RLRR38SU-9	5365-151-7154	Step Drill Drive Wrench Drive Tool	RCADC38-484 R1108-W R208-D	5133-177-7269 5120-473-7702 5120-473-7015
Engine Mount Pad on Inlet Housing	RJ210SX-16	5340-151-5943	RLRR56SU-11	5365-151-7156	Step Drill Drive Wrench Drive Tool	RCADC56-641S R1111-W R210-D	5133-116-2774 5120-776-1837 5120-473-7017
Customer Bleed Port	SRW258	5340-407-9261	-	-	Step Drill Drive Wrench Swage Tool	SRW-25D SR25W4-A SRW25S-A	5133-782-4231 5120-169-0124 5120-177-9529
Inlet Housing N2 Gearbox Mounting Pad and Forward Face of Centrifugal Compressor Housing	RJ206SX-8	5340-151-5971	RLRR28SU-8	5365-151-7152	Step Drill Drive Wrench Drive Tool	RCADC28-312 R1106-W R206-D	5133-177-7268 5120-381-9126 5120-473-7013
Accessory Gearbox Chip Detector Port	R1711SX-9	5340-151-5981	RLRR56SU-8	5365-151-7210	Step Drill Drive Wrench Drive Tool	RCAD56-687 R1111-W R1711-D	5133-116-2800 5120-776-1837 5120-169-0123
Inlet Housing Torquemeter Pressure Port	R1709SX-9	5340-151-5980	RLRR47SU-8	5365-151-7155	Step Drill Drive Wrench Drive Tool	RCAD47-562 R1110-W R209-D	5133-116-2820 5120-473-7703 5120-473-7016
Accessory Gearbox Starter Drain	R1707SX-8	5340-151-5979	RLRR38SU-7	5365-151-7153	Step Drill Drive Wrench Drive Tool	RCAD38-453 R1108-W R1707-D	5133-116-2793 5120-473-7702 5120-169-0122
Hydraulic Port on N2 Gearbox	RZA12112	5340-151-7309			Porting Tool	RZA12112PT	5133-419-9680

Table 7-7B. Common Size Rework Tools and Dimensions Used at Hydraulic and Nonhydraulic Locations

STEP DRILL DEPTH IN INCHES *	TAP SIZE IN INCHES		TAP DEPTH IN INCHES	PACKING NO.
11/64 to 13/64	N. C.	9/16-12	21/32	N/A
13/64 to 15/64	N. C.	3/4-10	1-1/8	N/A
3/32	National Standard	11/32-24	27/64	N/A
5/32 to 3/16	N. C.	3/8-16	17/32	N/A
9/32	N. C.	3/4-16	Full Depth	NAS1594-115
17/64 to 9/32	N. C.	5/8-18	11/16	NAS1594-112
17/64 to 9/32	N. F.	1/2-2	5/8	NAS1594-110
9/64	United National Extra Fine	7/16-28	21/64	NAS1594-012

See figure 7-69A for step drill special chamfer.

TE: Repairs No. 1 through 4 are to be used when converting from a wire to a Rosan insert at nonhydraulic locations. Repairs No. 5 through 8 are to be used at hydraulic port locations.

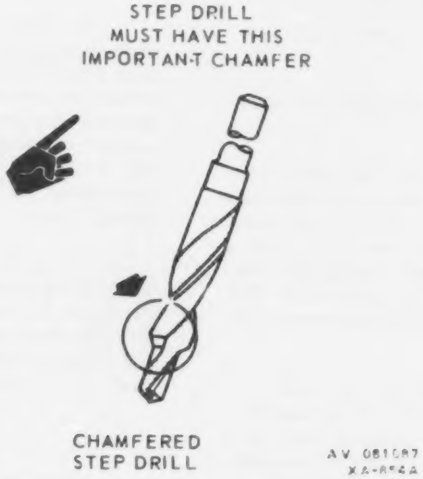

STEP DRILL
MUST HAVE THIS
IMPORTANT CHAMFER
CHAMFERED
STEP DRILL
AV 081087
XA-856A

Figure 7-69A. Location of Special Chamfer on Step Drill

(1) Select the Rosan insert material, special and common tools listed in tables 7-7A and 7-7B.

(2) (Deleted)

(3) Remove old or damaged wire insert. Step drill the existing hole so as to attain step in hole to depth specified in table 7-7B.

(4) Tap the hole with common size tap noted in Repair No. 2, table 7-7B, to a depth of 1-1/8 inches in the minor diameter hole.

(5) Coat the tapped magnesium threads with zinc-chromate primer (item 128, table 2-2). Initially engage the Rosan insert by hand and then install the drive wrench, R1111-W, onto the insert. Screw the insert into the magnesium housing to a depth of 0.010 to 0.020 inch below the surface of the material.

(6) Align the OD flat of the lockring nearest the pad surface edge with the least hole edge distance and where serrations of both lockring and insert align. Install the drive tool, R210-D, over the lockring.

(7) Using a hammer, strike the end of the drive tool to drive the lockring into the magnesium parent metal until the lockring is flush or to a depth of 0.010 inch below the surface of the material.

c. Repair accessory gearbox chip detector port. (Refer to tables 7-7A and 7-7B.) Proceed as follows:

CAUTION

When repairing hydraulic ports, pack the end of the port with petrolatum (item 87, table 2-2) or suitable substitute to prevent machining chips from entering oil system.

(1) Select the Rosan insert material and special tools listed in table 7-7A.

(2) Coat tips of step drill, RCAD56-687, with petrolatum (item 87, table 2-2) or suitable substitute to pick up chips. Using step drill, cut to a counterbore depth of 9/32 inch maximum below boss face. Tap minor diameter hole to its full depth, using the common size tap listed in Repair No. 5, table 7-7B. Remove petrolatum and chips from tip of counterbore tool and hydraulic port.

(3) Lubricate packing, NAS1594-115, with shortening compound (item 95, table 2-2) or castor oil (item 13, table 2-2) and install packing over the smooth shank of the insert. Coat the tapped magnesium threads with zinc-chromate primer (item 128, table 2-2). Initially engage the Rosan insert by hand.

CAUTION

Once the packing has engaged the parent metal, do not back out the insert (counterclockwise). If the insert must be turned out after partial engagement of the packing, replace the packing and repeat preceding steps (1) through (3).

(4) Install the drive wrench, R1111-W, over insert and turn the insert until the top of the serr flange is 0.010 to 0.020 inch below the surface of material.

(5) Align the OD flat of the lockring nearest pad surface edge with the least hole edge distance where serrations of both lockring and insert alig Install the drive tool, R1711-D, over the lockring

(6) Using a hammer, strike the end of the d tool to drive the lockring into the magnesium par metal until the lockring is flush with or to a depth 0.010 inch below the surface of the material.

d. Repair hydraulic port on the N2 gearbox. (fer to tables 7-7A and 7-7B.) Proceed as follow

CAUTION

When repairing hydraulic ports, pack the end of the port with petrolatum (item 87, table 2-2) or suitable substitute to prevent machining chips from entering the engine oil system.

(1) Select the Rosan insert material and sp cial porting tool listed in table 7-7A.

(2) Porting tool, RZA12112PT, has a speci stop to prevent overcutting. Coat tip of porting t with petrolatum (item 87, table 2-2) or suitable stitute to pick up chips. Using porting tool, cut u special stop contacts face of boss. Tap minor di meter hole with the common size tap listed in R No. 8 table 7-7B, to a depth of 21/64 inch. Clean petrolatum and chips from tip of porting tool and draulic port.

(3) Lubricate packing, NAS1594-012, with shortening compound (item 95, table 2-2) or cas oil (item 13, table 2-2) and install packing over smooth shank of the insert. Coat the tapped mag um threads with zinc-chromate primer (item 12 table 2-2). Initially engage the Rosan insert by

CAUTION

Once the packing has engaged the parent metal, do not back out the insert (counterclockwise). If the insert must be turned out after partial engagement of the packing, replace the packing and repeat preceding steps (1) through (3).

(4) Using a standard wrench on the hex head of insert, tighten the insert to 45 pound-inches torque.

CAUTION

When engaging or removing the union from the insert, double wrench both the insert and the union.

e. Remove a Rosan insert and replace with a Ro- insert of the same size as follows:

(1) Remove damaged Rosan insert as shown in re 7-69B.

(2) Select proper size Rosan insert material special tools listed in table 7-7A for the specific ir location.

(3) Coat original tapped magnesium threads zinc-chromate primer (item 128, table 2-2).

(4) Install Rosan insert with applicable drive ch and stake with applicable drive tool.

NOTE

No special counterbore and/or step drill tools are required when replacing one Rosan insert with a comparable Rosan insert.

3. CONNECTOR THREAD REPAIR PROCEDURE. eaded male connectors shall be repaired as fol- s:

a. Remove surface corrosion with crocus cloth m 23, table 2-2).

. Remove burrs and nicks from threads with ll triangular file.

c. Thoroughly clean connector with drycleaning solvent (item 28, table 2-2).

7-139. FUSION WELD. Proceed as follows:

NOTE

If the part requires various weld repairs, remove surface treatment from entire part.

a. Vapor-degrease part.

b. Using a carbide burr, rout each imperfection to expose clean, sound, base metal. Minimize routing to lessen the possibility of breaking through the parent metal.

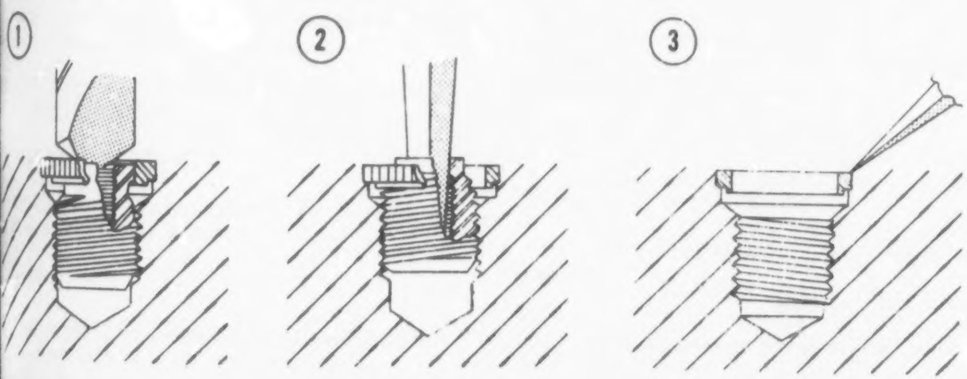
c. Reinspect part to ensure that complete removal of imperfection has been accomplished.

d. Remove all surface treatment from local area to be welded. Normally, removal with stainless steel brush is adequate.

e. Thoroughly clean chips, scale, dirt, oil and any other foreign material detrimental to proper welding from all areas to be welded.

f. Vapor-degrease parts. Do not sandblast or steel-grit blast parts that are to be welded.

g. Back up the area to be repaired with copper or inert gas and reweld, using tungsten inert gas process, Military Specification MIL-W-8611, with the filler material specified in the applicable table within the detail repair procedures.



ILL OUT SERRATED COL- AR OF INSERT. USE DRILL ME DIAMETER AS SERRA- NS. DRILL TO DEPTH OF NTERBORE. USE DRILL HIGH SPEED

DRIVE IN SQUARE-TYPE "EASE OUT" TOOL OR SIMILAR SQUARE TOOL. SCREW OUT INSERT.

IF LOCK RING FAILS TO COME OUT AS INSERT IS UNSCREWED, COLLAPSE REMAINING PORTION OF RING WITH PUNCH.

PERFORM IN SEQUENCE SHOWN

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Figure 7-69B. Rosan Insert Removal Procedure

h. If specified in the detailed repair procedure, a variance of plus or minus 50° F during welding operation shall be maintained.

i. If postheat is specified in detail repair procedure, maintain the preheat temperature and postheat each area immediately after weld repair, maintaining a temperature variance of plus or minus 25° F.

j. Blend the weld repair and any burn-through with the surrounding parent metal to minimize stress concentrations.

k. Weld beads shall be smooth and free from irregularities, in accordance with aircraft quality welding practices, and shall blend into base metal in gradual smooth curves.

l. Overlapping and lack of fusion of the weld beads are not acceptable.

m. Penetration of butt welds shall be 100 percent unless otherwise specified.

n. Penetration (under bead) of a butt weld should not exceed one-third the thickness of the thinner b material and penetration excess shall be removed if it causes interference when parts are assembled and mated.

o. Cracks are not acceptable.

p. Surface porosity is acceptable provided its size is less than one-third the material thickness but not greater than 0.080 inch and the minimum spacing between the porosities is three times the dimension of the largest defect. There shall be no more than three indications of maximum size, or equivalent, per linear inch.

q. Internal defects shall not exceed requireme of preceding step p., except that maximum defect s shall not exceed twice the material thickness or 0.100 inch maximum.

7-140. REFINISHING PAINTED SURFACES. Refin ing of anodized aluminum parts is not required, pr vided that all paint has been removed and anodizin neither damaged nor destroyed. Spot refinishing of minum, using chemical film (item 15, table 2-2) is rmissible. Scratched or exposed painted areas ll be protected with a chemical film, then spot-nted to prevent surface corrosion.

141. CHEMICAL FILM TOUCHUP PROCEDURE R ALUMINUM AND ALUMINUM ALLOYS. The lowing procedure applies to parts that are to be ched up. Apply chemical film coat in accordance th Military Specification MIL-C-5541 and the lowing steps.

CAUTION

If chemical film is left on exposed areas for more than 6 minutes, a loose powdery coating will form resulting in poor metal protection.

a. Clean all areas to be touched up, using trichloro-ylene (item 113, table 2-2).

NOTE

Temperature of rinse water in following step b., must be below 160°F.

b. Using cotton swab, apply chemical film to atched areas. Allow trichloroethylene to remain rea for 3 to 6 minutes; then rinse quickly with water.

c. Dry parts with dry oil-free compressed air.

d. If part was previously painted, apply zinc-omate primer (item 127 or 128, table 2-2) to the hed-up area.

. Air dry or use infrared lamp to force-dry kly on humid days.

. Apply engine gray epoxy to the touched-up area tlined in steps f.(1) and (2), paragraph 7-143.

2. TOUCHUP PROCEDURE FOR ALUMINUM-TED STEEL PARTS.

NOTE

For successful touchup, area to be painted must be thoroughly cleaned.

. (Deleted)

. Clean areas to be painted with toluene (toluol) 112, table 2-2) to remove contaminants.

. Lightly abrade all areas to be painted, using r dry sandpaper with a grit size depending on ce conditions. Finish sanding with a No. 320 sandpaper (item 93, table 2-2).

. Apply light even coat of paint (item 5A, table to areas.

e. Air dry or use infrared lamp to force-dry quickly on humid days.

7-143. TOUCHUP PROCEDURE FOR MAGNESIUM AND MAGNESIUM ALLOYS. Proceed as follows:

CAUTION

When performing following step a., the blend must be smooth and continuous to minimize possible stress-concentration areas.

a. Using smooth stone or crocus cloth (item 23, table 2-2), blend nicks, scratches, or reworked areas to surrounding metal.

aA. Remove powdery corrosion scale by brushing with stiff fiber brush.

b. Thoroughly clean area to be touched up with methyl-ethyl-ketone (item 75, table 2-2) followed by acetone (item 3, table 2-2). Allow 15 minutes for it to dry thoroughly.

NOTE

Surrounding areas not requiring touchup shall be masked or shielded.

WARNING

Both liquid nitric acid used in following step c. and its vapors are a personnel hazard. Avoid contact with skin, eyes, or clothing. Avoid inhalation of vapors. In case of contact, immediately flush skin or eyes with warm water for at least 15 minutes. Get medical attention.

c. Using cotton swab, locally apply chrome pickle solution (1.5 pounds sodium dichromate (item 98, table 2-2) and 1.5 pints nitric acid (item 80, table 2-2) with a specific gravity of 1.42, to one gallon of water at ambient temperature) to exposed area. Allow solution to remain on surface for 2 to 5 minutes; then rinse thoroughly with cold water.

d. Dry part with clean dry cloth.

e. Using 500-watt heat lamps or equivalent, dry parts for 10 to 15 minutes.

f. (Preferred Method) - Apply epoxy sealant as follows:

NOTE

Do not intermix epoxy sealant materials.

(1) Mix one of epoxy sealants as outlined in table 7-8.

(2) Using paint brush, apply epoxy to exposed areas. Thickness shall blend smoothly with original coating.

g. Remove masking or shielding.

CAUTION

In following step h., a relative humidity greater than 65 percent may impair the curing process. Do not clean the epoxy surface with solvents for at least one week.

NOTE

In following step h., a 250-watt reflector heat lamp placed 2 to 4 inches from the epoxy surface will cure the epoxy in approximately 3 hours, provided the surface temperature reaches 120°F by the end of the cure cycle.

Table 7-8. Epoxy Sealants For Magnesium and Magnesium Alloy Touchup Procedure

OMENCLATURE	PART NUMBER	MANUFACTURER	SPECIAL INSTRUCTIONS
	PIGMENTED EPOXY SEALANTS		
Beige Epoxy Beige Epoxy	E4634, Component A E4634, Component B	Voltax Co., Inc. Bridgeport, Conn., or equivalent	Mix equal parts by volume and allow to stand for 1/2 hour. Restir before use
Gray Epoxy Gray Epoxy	E2833, Component A E2833, Component B	Voltax Co., Inc. Bridgeport, Conn., or equivalent	Mix equal parts by volume and allow to stand for 1/2 hour. Restir before use.
Beige Epoxy Thinner	S3612-806 (Synthetisine 200 Base) T336	Mobil Chemical Co. New York, N.Y., or equivalent	Mix equal parts by volume
Gray Epoxy Thinner	S3612-808 (Synthetisine 200 Base) T336	Mobil Chemical Co. New York, N.Y., or equivalent	Mix equal parts by volume
	CLEAR EPOXY SEALANTS		
Epoxy Thinner	Epon 828 Triethylometetramine	Miller-Stephenson Chemical Co. Danbury, Conn., or equivalent	Mix 100 parts Epon 828 to 15 parts triethylometetramine
Clear Synthetic Thinner	4-56 4-111	Reliance Varnish Co. Chicago, Ill., or equivalent	Mix equal parts
Clear Baking Epoxy Epoxy Reducer	V-4936 T64	Voltax Company, Bridgeport, Conn., or equivalent.	Mix equal parts

Epoxy shall be cured at 70° F for a minimum of urs.

(Alternate Method) - Apply enamel coating as s:

(1) Apply coat of zinc-chromate primer (item table 2-2). Allow primer to dry.

(2) Apply engine gray, aircraft gray, olive gloss black, aircraft cream, or light green d (item 51, table 2-2).

TOUCHUP PROCEDURE FOR BLACK OXIDE HED PARTS. Touchup repaired areas on black finished parts by using gun blueing (item 54, 2-2).

REPAIR AND REPLACEMENT OF NON- HOSES, IGNITION LEAD AND COIL AS- LY, AND ELECTRICAL CABLE ASSEMBLY. ed as follows:

CAUTION

Any twisting of hoses is unacceptable. When loosening or replacing connections, always use two wrenches. Use on on the B nut and the other on the hexagonal portion of the nipple to avoid twisting the hose. (See figure 3-9.)

a. Repair minor cuts, fraying, and chafing on hose with teflon spiral sleeve in accordance with table 7-7.

NOTE

The use of chafing sleeve is not limited to hoses. Where operating temperatures permit, it may be used to prevent chafing of harnesses and wiring.

b. Repair minor nicks and burrs on fittings with small diesinker type file or India or carborundum stone. Blend repairs using crocus cloth (item 23, table 2-2). Repair damaged threads as outlined in paragraph 7-138.

bA. Minor chafing or fraying to the extent of [illegible] more than three broken wire strands in one inch is permissible on ignition lead and coil and electrical cable assemblies, provided there is no damage to the underlying insulation. Where operating temperatures permit, repair minor chafing or fraying with chafing sleeve in accordance with table 7-7.

c. Visually inspect for leaks on first engine run.

7-146. REPAIR OF ENGINE COMPONENTS.

7-147. REPAIR OF OVERSPEED GOVERNOR AND TACHOMETER DRIVE ASSEMBLY (T53-L-7/7A/15 Engines). Replace bearing liners as follows:

a. Mount overspeed governor and tachometer drive cover or housing in suiting lathe.

CAUTION

Do not nick or score the bore of the casting.

b. Machine liner until wall is thin enough to buckle and peel away from cover.

c. Remove bearing liner from casting.

d. Grind two lockpins in the casting flush with bore.

e. Remove overspeed governor and tachometer drive cover or housing from lathe and place on bench.

f. Using marking pencil (yellow) (Colorbrite No. 2107) (item 72, table 2-2), mark positions of lockpins on face of casting.

g. Place new liner into mixture of dry ice and alcohol for 30 minutes.

h. Apply thin coat of zinc-chromate primer (item 128, table 2-2) to casting bore before installing liner.

CAUTION

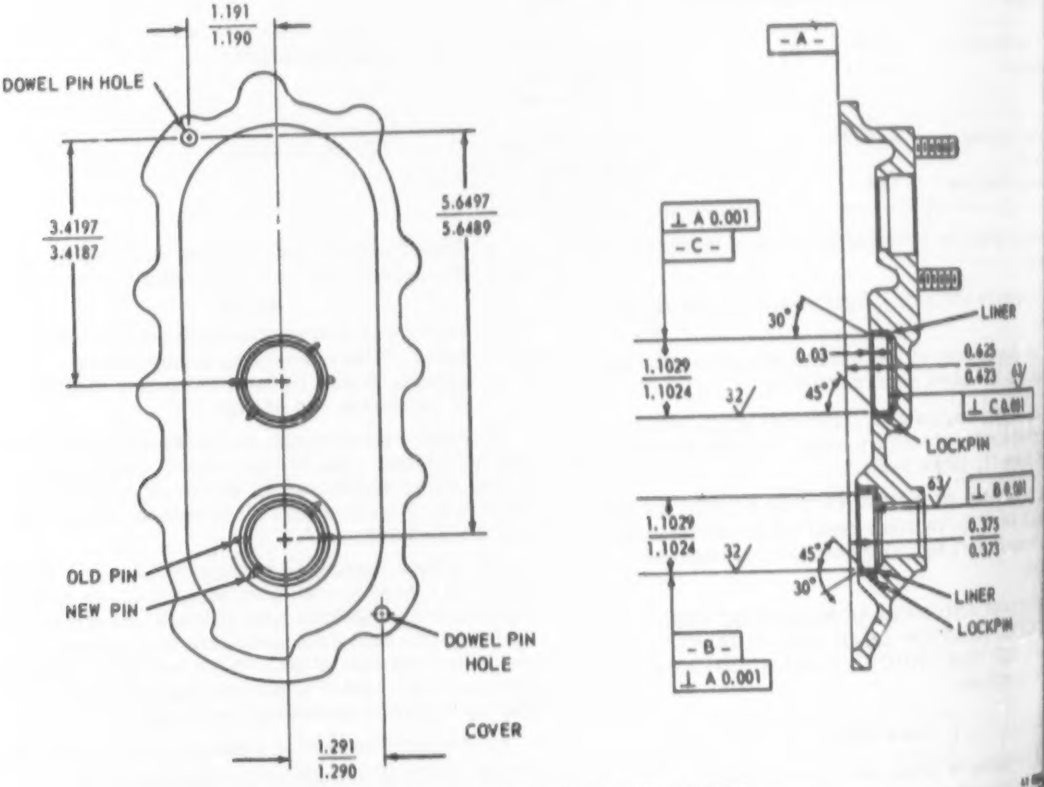
During pressing operation in following step i., ensure that casting is properly supported from below.

NOTE

When installing liner into housing, ensure that lockpin holes are not aligned with old lockpin locations.

i. Remove bearing liner from alcohol and dry mixture and quickly insert liner, chamfered face into bore. Using suitable adapter and press, press liner into casting until it bottoms.

j. Using No. 53 drill, drill two holes through into the casting, 0.030 inch deep, at angle shown figure 7-70, Sheet 1.


1.191
1.190
DOWEL PIN HOLE
3.4197
3.4187
5.6497
5.6489
OLD PIN
NEW PIN
DOWEL PIN HOLE
1.291
1.290
COVER
- A -
⊥ A 0.001
- C -
30°
LINER
0.03
1.1029
1.1024
32
45°
0.625
0.623
63
⊥ C 0.001
LOCKPIN
63
⊥ B 0.001
1.1029
1.1024
32
45°
0.375
0.373
30°
LINER
LOCKPIN
- B -
⊥ A 0.001

ALL DIMENSIONS ARE IN INCHES

Figure 7-70. Overspeed Governor and Tachometer Drive Assembly - Bearing Liner Repair (Sheet 1 of 2)

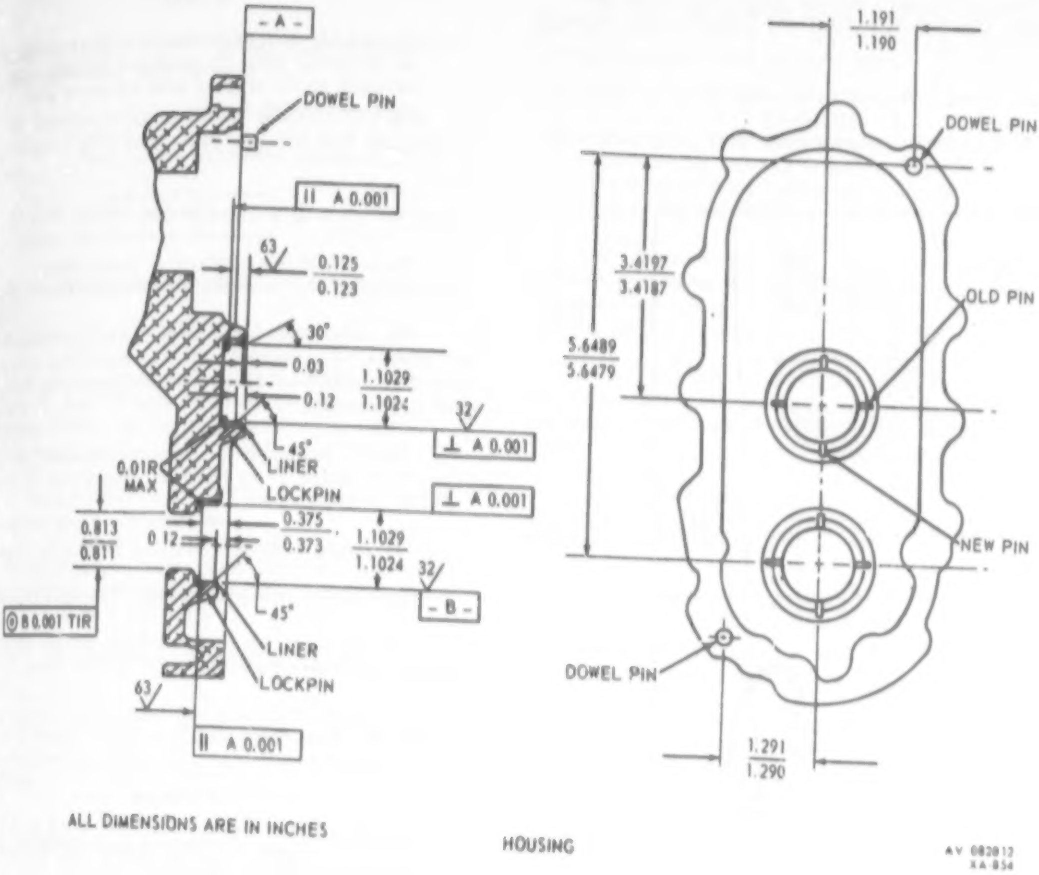

- A -
DOWEL PIN
II A 0.001
63
0.125
0.123
30°
0.03
0.12
1.1029
1.1024
32
⊥ A 0.001
45°
LINER
0.01R MAX
LOCKPIN
⊥ A 0.001
0.813
0.811
0.12
0.375
0.373
1.1029
1.1024
32
- B -
◎ B 0.001 TIR
45°
LINER
LOCKPIN
63
II A 0.001
1.191
1.190
DOWEL PIN
3.4197
3.4187
5.6489
5.6479
OLD PIN
NEW PIN
DOWEL PIN
1.291
1.290
ALL DIMENSIONS ARE IN INCHES
HOUSING
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Figure 7-70. Overspeed Governor and Tachometer Drive Assembly - Bearing Liner Repair (Sheet 2 of 2)

NOTE

Up to this point, the procedure is the same for both the cover and housing, except for lockpin hole location. In the housing, drill the lockpin holes 180 degrees apart and 90 degrees from the original holes. For the cover, drill the lockpin holes 180 degrees apart and 45 degrees from the original holes. (See figure 7-70, Sheet 1.)

Ream lockpin holes to 0.0610 to 0.0615 inch ter, 0.280 inch deep. Using compressed air, blow from holes.

CAUTION

Do not damage liner when driving lockpins in following step l.

Apply thin coat of zinc-chromate primer (item ble 2-2) to lockpins and, using suitable drift, ins flush with ID of liner.

NOTE

When grinding in following step m., locate bearing bores from dowel pin or dowel pin holes as shown in figure 7-70, Sheet 2.

m. Finish-grind liner to dimensions shown in figure 7-70.

n. After finish grinding, clean cover or housing with drycleaning solvent (item 28, table 2-2).

o. Ensure that replaced bearing liners are square with A surface within 0.001 inch. (See figure 7-70, Sheet 2).

7-148. REPAIR OF OVERSPEED GOVERNOR AND TACHOMETER DRIVE ASSEMBLY (T53-L-701 Engine). Information to be supplied at later date.

7-149. REPAIR OF ACCESSORY DRIVE GEARBOX ASSEMBLY. Proceed as follows:

a. Repair damaged oil-air separator drive gearshaft (63, figure 6-5, Sheet 2) as follows: (See detail B, figure 7-71.)

(1) Using 1/8-inch drill, drill out six rivets (1).

(2) Carefully separate gear (3) from gearshaft (2).

NOTE

If gear (3) and/or gearshaft (2) are replaced in following step (3), angular relationship between teeth of gear and spline of gearshaft may vary freely.

(3) Replace defective component.

CAUTION

Do not damage surface of gears when peening rivets in following step (4).

(4) Align rivet holes of gear and gearshaft. U new rivets (1), assemble oil-air separator gearsh assembly. Back up rivet with suitable tool and he over by peening.

b. Repair damaged oil pump drive gearshaft (figure 6-5, Sheet 2) as follows: (See detail C, fig 7-71.)

(1) Using 1/8-inch drill, drill out six rivets

(2) Carefully separate gear (7) from gearsha

(3) Remove cup (8) by driving out pin (6) wi suitable drift and mallet.

(4) Replace defective components and instal new pin (6). Stake both sides of pin.

CAUTION

Do not damage surface of gears when peening rivet in following step (5).

(5) Align rivet holes of gear and gearshaft using new rivets, assemble oil pump drive gear Back up rivet with suitable tool and head over by peening.

NOTE

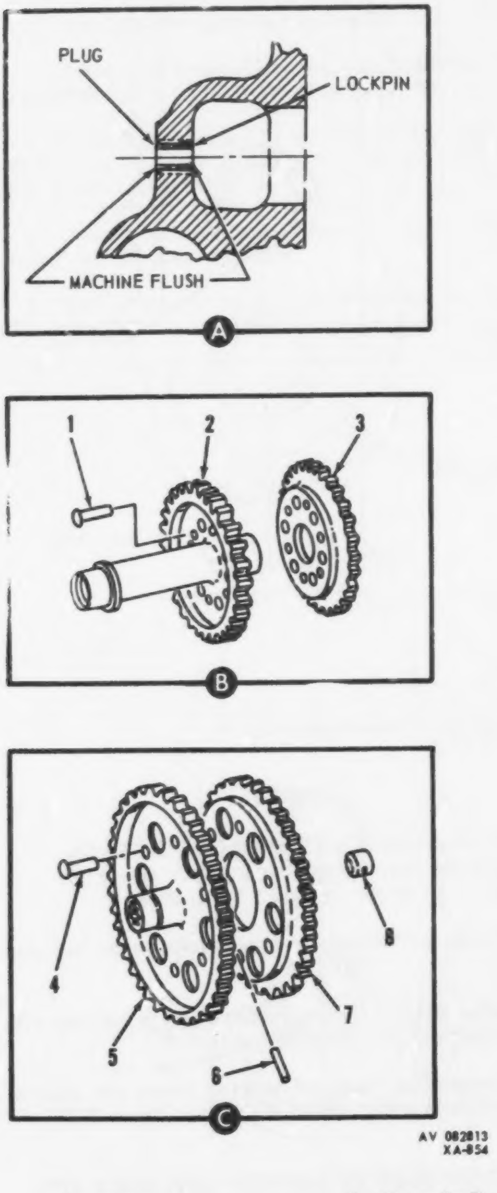
Angular relationship between teeth of gear (7) and spline of gearshaft (5) may vary freely.

c. Repair damaged baffle mounting tapped hol accessory gearbox housing assembly (90, figure Sheet 2) as follows: (See detail A, figure 7-71.)

(1) Using 0.3299 to 0.3372 inch diameter d drill baffle mounting hole.

(2) Using 0.375-24 UNF tap, tap baffle mou hole through material.

(3) Using magnesium alloy (item 68, table 0.625 inch diameter hex stock, fabricate plug wi 0.375-24 thread, 0.750 inch long.



1. Rivet
2. Gearshaft
3. Gear
4. Rivet
5. Gearshaft
6. Pin
7. Gear
8. Cup

Figure 7-71. Accessory Drive Gearbox Assembly - Repair Areas

NOTE

achine thread size to obtain 0.0005 to 0.0010 ch tight fit in tapped hole.

(4) Undercut plug shank at end of 0.750 inch d length, 0.072 inch wide to 0.308 to 0.312 inch eter.

(5) Coat tapped hole and plug with zinc-chromate er, (item 128, table 2-2).

(6) Install plug and machine flush at both surfaces.

NOTE

When drilling lockpin hole in following step (7), half of hole shall extend into the parent metal and the other half shall extend into the plug.

(7) Using 0.0607 to 0.0617 inch diameter drill, lockpin hole 0.125 inch deep.

(8) Using magnesium alloy (item 68, table 2-2) 5 ±0.0005 inch diameter round stock, fabricate n to length of 0.125 inch.

(9) Install lockpin flush with surface and stake ely.

(10) Using 0.2113 to 0.2190 inch drill, drill new mounting hole through plug. Countersink hole grees.

(11) Using 0.250-28 UNF-3B tap, tap baffle ng hole completely through plug.

(12) Touch up reworked area. (Refer to para- 7-142.)

If scored bearing liners are found, replace liners lows.

CAUTION

Do not nick or score the bore of the casting when machining in following step (1).

(1) Machine bearing liner wall to thickness of o 0.014 inch or until liner wall is thin enough le and peel from casting.

NOTE

ark position of pins on surface of casting ith a marking pencil (yellow) (Colorbrite o. 2107) (item 72, table 2-2) after grinding n following step (2).

(2) Grind two pins in casting flush with bore.

(3) Place casting into temperature-controlled t 132°F for 30 minutes. Place new liner in re of dry ice and alcohol for 30 minutes.

(4) Remove casting from oven and apply thin coat of zinc-chromate primer (item 128, table 2-2) to surface that will mate the new liner.

CAUTION

Ensure that casting is supported below bore prior to pressing operation in following step (5).

(5) Remove liner from dry ice and alcohol mixture and place into casting with chamfer down. Using suitable adapter and press, press liner into casting until it bottoms.

(6) Using No. 43 drill, drill two holes through liner 180 degrees apart and 90 degrees from original pin location marked on casting. Drill to depth of 0.360 inch.

(7) Ream holes to diameter of 0.091 to 0.092 inch and depth of 0.330 inch. Remove all chips from hole, using dry compressed air.

CAUTION

When driving pins in following step (8), be careful not to damage liner.

(8) Apply thin coat of zinc-chromate primer (item 128, table 2-2) to lockpins and, using suitable drift, drive pins flush with ID of liner.

(9) Finish-grind liners in accessory gearbox housing assembly as shown in figure 7-4, Sheet 2.

e. Inspect repaired accessory gearbox cover assembly. The 1.1029 to 1.1024 and the 1.1816 to 1.1811 inch diameters must be square with the A surface within 0.0003 inch.

f. Inspect repaired accessory gearbox housing assembly. The 1.6541 to 1.6535, the 1.1029 to 1.1024, and the 1.3781 to 1.3778 inch diameters must be square with the A surface within 0.0003 inch. The 1.051 to 1.050 inch diameter must be concentric with 1.1029 to 1.1024 inch diameter with 0.001 TIR. The 1.500 to 1.498 inch diameter must be concentric with 1.6541 to 1.6535 inch diameter within 0.0013 inch.

g. Repair damaged threads of chip detector port on accessory drive gearbox as follows:

(1) Using 0.577 to 0.586 inch diameter drill, remove damaged threads.

(2) Using 0.650 inch diameter counterbore, counterbore to depth of 0.083 to 0.098 inch.

(3) Using tap, P/N 38193-9, (Heli-Coil Corporation, Insert Products Division or equivalent), tap through material.

(4) Flush out gearbox to remove any chips using drycleaning solvent (item 28, table 2-2).

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(5) Cut off 1/8 to 1/4 coil, as measured from end of insert, P/N 1191-9CN x 0.438, (Heli-Coil Corporation, Insert Products Division or equivalent) and remove burrs.

(6) Install insert. (Refer to TM 55-1500-204-25/1).

(7) Using tang breakoff tool, P/N 1196-9, (Heli-Coil Corporation, Insert Products Division or equivalent), remove tang from gearbox.

7-150. REPLACEMENT OF ACCESSORY DRIVE GEARBOX SEALS.

Proceed as follows:

a. Replacement of tachometer drive seal. (See figure 7-72.)

NOTE

It is not necessary to remove accessory drive gearbox from engine to replace tachometer drive seal.

(1) Remove nuts (8) and washers (7) that secure shipping cover (6), if installed, gasket (5), and tachometer drive flange and seal assembly (1) to accessory drive gearbox (26).

(2) Using two 10-32 puller screws, withdraw tachometer drive flange and seal assembly from accessory drive gearbox and remove packing (3).

(3) Using installing tool (LTCT501) and arbor press, remove seal (2) from bearing retainer (4).

(4) Dip new seal (2) in lubricating oil (item 63 or 64, table 2-2). Using installing tool (LTCT501), press seal into tachometer drive flange and seal assembly (1).

(5) Position packing (3) on outside diameter of bearing retainer (4). Place flange and seal assembly over mounting stud, and install gasket (5) and shipping cover (6), if removed. Fasten with nuts (8) and washers (7).

b. Replacement of fuel control drive seal. (See figure 7-72.)

NOTE

It is not necessary to remove accessory drive gearbox from engine to replace fuel control drive seal.

(1) Remove bolts (9) that secure seal and liner assembly (10) to accessory drive gearbox (26).

(2) Using two 10-32 puller screws, separate seal and liner assembly from accessory drive gearbox, and remove packing (12).

(3) Using installing tool (LTCT100) and an arbor press, remove seal (13) from fuel control drive liner (11).

(4) Dip new seal (13) in lubricating oil (item 63 or 64, table 2-2). Using installing tool (LTCT100) or suitable drift, press seal into fuel control drive liner (11).

(5) Install packing (12) into groove in accessory drive gearbox and secure seal and liner assembly (1 with bolts (9).

c. Replacement of starter drive seal. (See figure 7-72.)

NOTE

It is not necessary to remove accessory drive gearbox from engine to replace starter drive seal.

(1) Remove nuts (14) and washers (15) that secure gaskets (17 and 19), shipping cover (16), if installed, and support (18) to accessory drive gearbox (26).

(2) Remove bolts (20) that secure seal and housing assembly (21).

NOTE

Turn puller screws in following step (3) simultaneously and evenly to prevent oil seal housing from cocking or jamming in accessory drive gearbox.

(3) Using two 10-32 puller screws, remove and housing assembly by turning screws clockwise until seal and housing assembly separates from accessory drive gearbox. Remove packing (23).

(4) Using arbor press and seal removal tool (LTCT3648), press seal (25) from oil seal housing Remove packing (24).

NOTE

Seal must be installed in following step (5), with solid side of seal case (side with part number) facing oil seal housing (22).

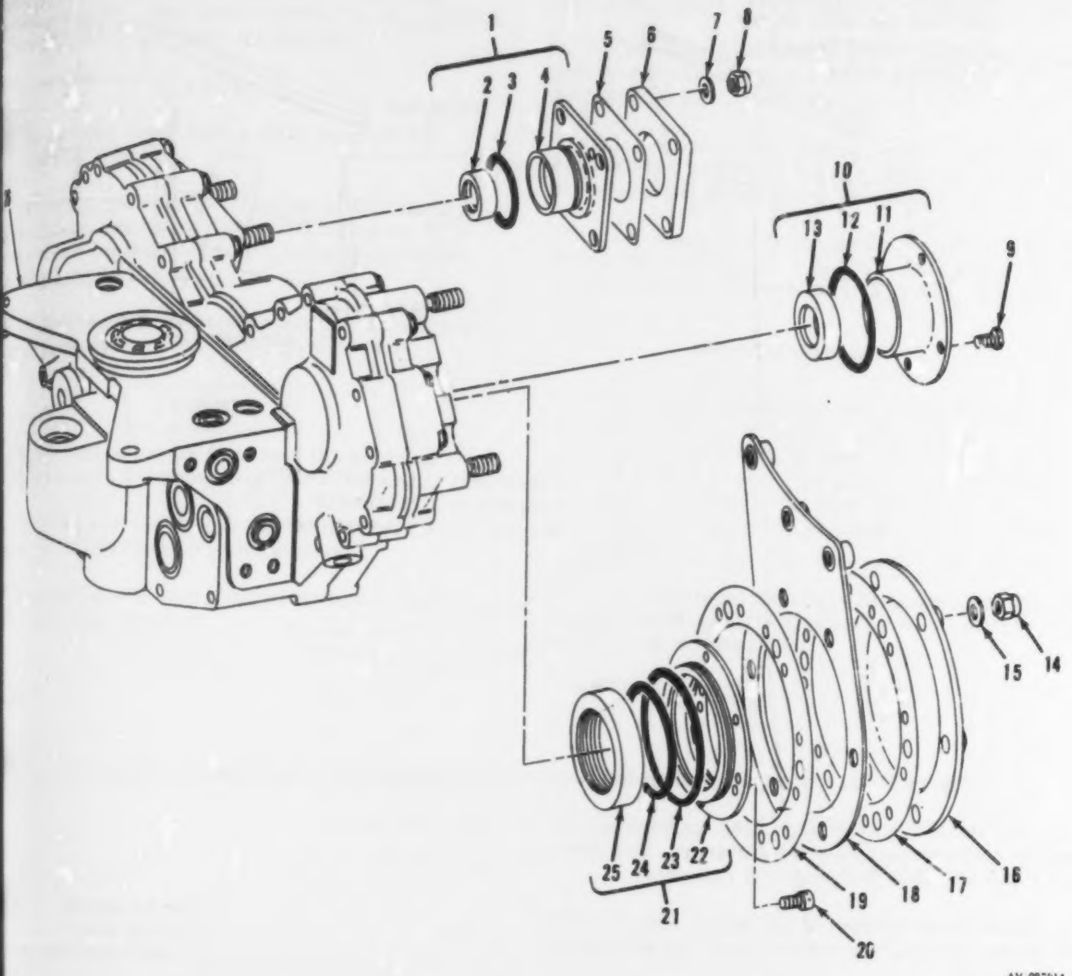
(5) Dip seal (25) in lubricating oil (item 63 64, table 2-2). Position packing (24) and seal (25) inside oil seal housing (22). Using installer (LTC and arbor press, press seal into housing.

(6) Place packing (23) on housing. Install and housing assembly (21) in accessory drive cover, using installation tool (LTCT511). Secure and housing assembly with bolts (20). Lockwire

(7) Install support (18), gaskets (17 and 19), shipping cover (16), if removed, on starter drive pad. Secure with nuts (14) and washers (15), tighten nuts to standard torque.

7-151. REPAIR OF SECOND STAGE TURB NOZZLE (T53-L-7/7A Engines).

Proceed as fo



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Tachometer Drive Flange
nd Seal Assembly
Seal
Packing
earing Retainer
Gasket
Shipping Cover
asher
ut

9. Bolt
10. Seal and Liner Assembly
11. Fuel Control Drive Liner
12. Packing
13. Seal
14. Nut
15. Washer
16. Shipping Cover
17. Gasket

18. Support
19. Gasket
20. Bolt
21. Seal and Housing Assembly
22. Oil Seal Housing
23. Packing
24. Packing
25. Seal
26. Accessory Drive Gearbox

Figure 7-72. Accessory Drive Gearbox Assembly - Exploded View

nes with surface nicks or dents that can be d by blending may be repaired, provided that nsions after repair do not exceed the following (See figure 7-73.)

) Repair of leading edge shall not exceed 1/2 gth and 1/16 inch in depth.

(2) Repair of trailing edge shall not exceed 5/8 inch in length and 1/8 inch in depth.

(3) Repair of airfoil shall not exceed 3/8 inch in diameter and depth shall not exceed 0.010 inch or 30 percent of original thickness after repair.

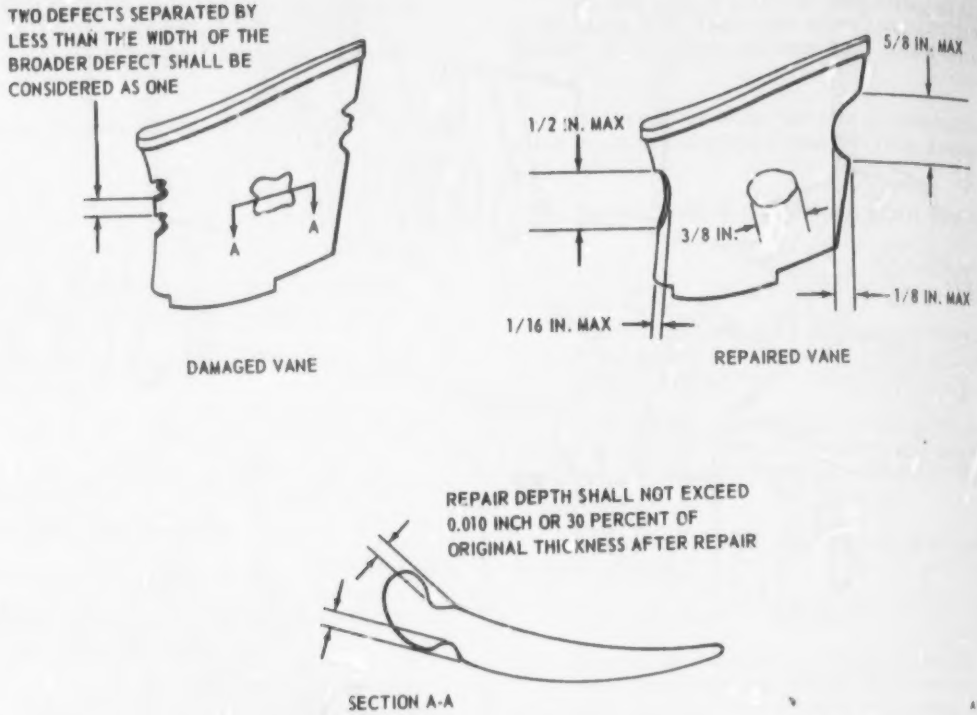

TWO DEFECTS SEPARATED BY LESS THAN THE WIDTH OF THE BROADER DEFECT SHALL BE CONSIDERED AS ONE
A
A
DAMAGED VANE
5/8 IN. MAX
1/2 IN. MAX
3/8 IN.
1/8 IN. MAX
1/16 IN. MAX
REPAIRED VANE
REPAIR DEPTH SHALL NOT EXCEED 0.010 INCH OR 30 PERCENT OF ORIGINAL THICKNESS AFTER REPAIR
SECTION A-A

Figure 7-73. Second Stage Turbine Nozzle Vane - Before and After Repair (T53-L-7/7A)

b. Use small diesinker type files, carbide rotary files, or carborundum stones for repairs. Use crocus cloth (item 23, table 2-2) for final polishing.

c. Make finish strokes of all repair work parallel with leading and trailing edge of vane. No scratches are permitted.

7-152. REPAIR OF POWER TURBINE CYLINDER (T53-L-7/7A Engines.) Proceed as follows:

a. If warpage was noted during inspection of power turbine cyliner, rework cylinder to obtain 0.032 inch minimum tip clearance after rework as follows:

(1) Determine minimum amount of material to be removed by subtracting smallest tip clearance from 0.032 inch. The result will be the approximate amount of material to be removed in order to obtain tip clearance requirements.

(2) Measure cylinder wall thickness at point of smallest tip clearance. (See figure 7-74.)

CAUTION

The resulting wall thickness determined in following step (3) shall not be less than 0.060 inch after one or more machining operations.

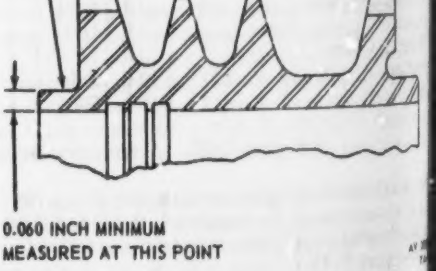

LATHE FACEPLATE ATTACHING POINT (CYLINDER MOUNTING FLANGE)
INDICATE THIS SURFACE TO CENTER CYLINDER IN LATHE
0.060 INCH MINIMUM MEASURED AT THIS POINT

Figure 7-74. Power Turbine Cylinder - Rew
Limits (T53-L-7/7A)

(3) Subtract thickness of material to be removed receding step (1)) from cylinder wall dimension receding step (2)). The result will be the approximate linder wall thickness after machining.

NOTE

Any suitable setup fixture may be used in following step (4).

(4) Attach cylinder to faceplate of lathe with acers between mounting flange and faceplate. The linder should be attached to the lathe at minimum eight bolt points.

(5) Indicate cylinder and reposition as necessary center cylinder on lathe. (See figure 7-74.)

CAUTION

Do not exceed a minimum wall thickness of 0.060 inch in following step (6).

(6) Using carbide tip boring tool or equivalent, out the inside diameter as required.

. Recheck blade tip clearances following instal-n of reworked cylinder.

7-153. REPAIR OF COMBUSTION CHAMBER HOUSING (T53-L-7/7A Engines).

Proceed as follows:

a. Housings with cracks at fuel vaporizer bosses that do not exceed the limits in paragraph 7-45 may be repaired as follows: (See figure 7-75.)

(1) Using center punch, indent housing beyond ends of each crack so that when stop-drilled the cracks will terminate at the hole. (See Detail A.)

(2) Using 1/8 (0.125 inch), No. 30 (0.1285 inch), or No. 29 (0.136 inch) drill, stop-drill parent metal at punch marks. Deburr inner and outer edges of each hole.

NOTE

If a crack extends beyond a hole when reinspected in following step (3), a second stop-drilled hole may be drilled beyond the end of the crack, provided that the total length of crack between the two extreme holes of the crack does not exceed 3 inches.

(3) Reinspect housing with magnifying glass to ensure that stop-drilled holes have completely terminated the existing cracks.

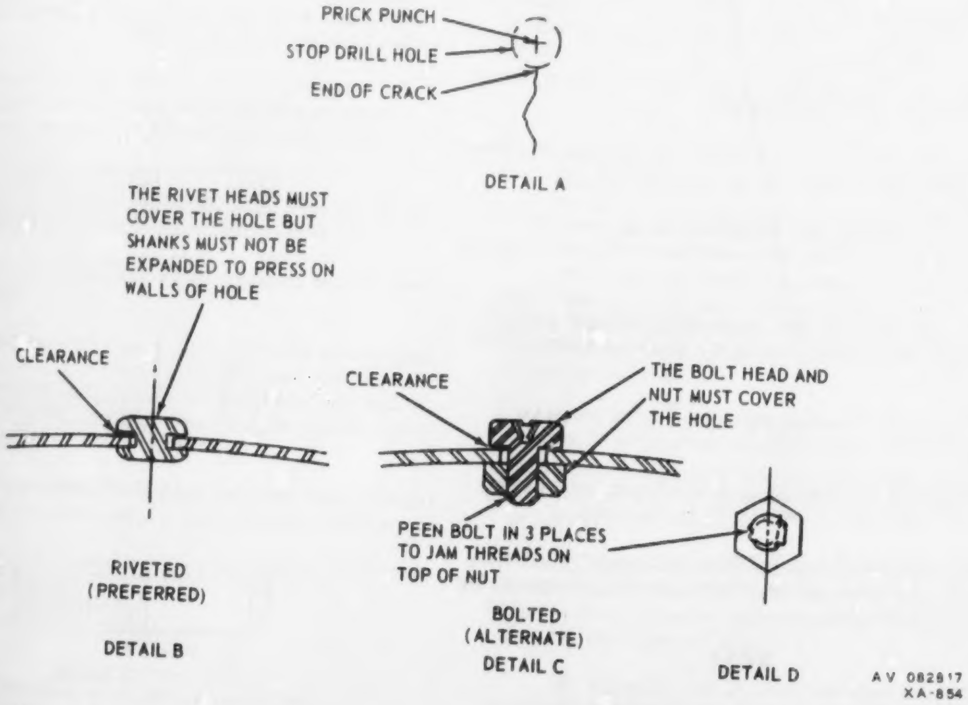

PRICK PUNCH
STOP DRILL HOLE
END OF CRACK
DETAIL A
THE RIVET HEADS MUST COVER THE HOLE BUT SHANKS MUST NOT BE EXPANDED TO PRESS ON WALLS OF HOLE
CLEARANCE
RIVETED (PREFERRED)
DETAIL B
CLEARANCE
THE BOLT HEAD AND NUT MUST COVER THE HOLE
PEEN BOLT IN 3 PLACES TO JAM THREADS ON TOP OF NUT
BOLTED (ALTERNATE)
DETAIL C
DETAIL D
AV 082817
XA-854

Figure 7-75. Combustion Chamber Housing - Crack Repair (T53-L-7/7A) (Typical)

(4) Close each stop-drilled hole as follows:

NOTE

Closing the stop-drilled holes prevents an excessive loss of air through the holes. Stop-drilled holes made at the edge of the weld fillets need not be closed when rivet heads or bolt heads will overlap the weld fillet.

(a) Insert corrosion resistant steel rivet, AN125439, into the hole from the convex side of the housing.

CAUTION

In following step (b), do not upset the rivet enough to expand the shank against the wall of the drilled hole. When the rivet is headed, some movement is permissible, provided that the heads cover the hole.

(b) Head the rivet on the concave side of the housing sufficiently to close the hole and draw both heads against the surfaces of the housing. (See Detail B.)

(c) If the preferred rivet cannot be obtained, one of the following alternate rivets may be used:

NUMBER	STOP DRILL SIZE	
AN125421	0.109	7/64
AN125440	0.140	9/64
AN125457	0.172	11/64
AN125475	0.203	13/64

(5) The stop-drilled holes may be closed, using alternate procedure, as follows:

(a) Insert bolt, MS35216-11, into the hole from the convex side of the housing. (See Detail C.)

(b) Install nut, MS35649-44, on the bolt. Tighten nut by hand or with maximum of 5 pound-inches of torque.

(c) Lock the nut in place by peening exposed threads of bolt against top of nut in three places. (See Detail D.)

b. Reinspect housing with magnifying glass to ensure that no cracks extend beyond the closures.

c. Replace cracked liner supports on combustion chamber housing 1-130-020-08 as follows:

(1) Remove damaged liner supports by grinding off heads of rivets, using rotary grinder, and punching rivets from housing.

NOTE

Position liner support in following step (2) with keyway towards the center of the combustion chamber housing.

(2) Position new liner support 1-130-230-01 the position from which the damaged support was removed.

(3) Temporarily secure liner support to com bustion chamber housing with nut and bolt.

(4) Using No. 30 (0.1285 inch diameter) drill drill through liner support. Back up support with block of wood.

(5) Secure liner support to combustion cham housing with two universal head rivets, AN125439.

7-154. REPAIR OF COMBUSTION CHAMBER LI (T53-L-7/7A Engines). Proceed as follows:

a. Repair outer liner as follows:

(1) Determine ends of crack.

(2) Using 1/16-inch diameter drill, stop-dr crack 1/16 inch beyond crack ends.

(3) Deburr both sides of stop-drilled holes.

b. Replace worn or damaged studs (8, figure 7 as follows:

(1) Remove retainer plate (6) that secures to bracket.

(2) Withdraw defective stud and replace wi new stud with key slot towards outer edge of liner (Replace stud with a like part number.) (See figur 7-76 for part numbers.)

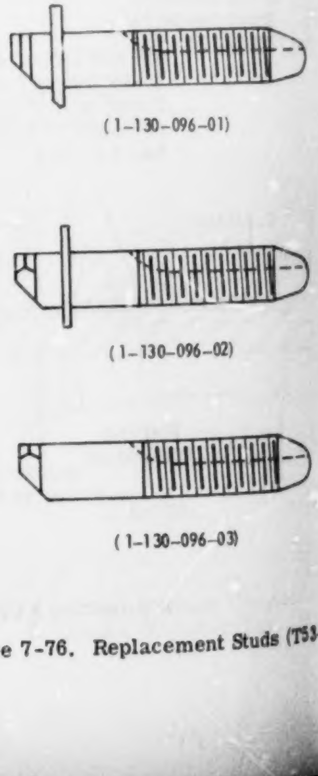


Figure 7-76. Replacement Studs (T53-L-7

(3) Install new retainer plate and bend back tabs lock stud in place.

c. On liner assembly 1-130-600-01 and 1-130-600-02, replace worn vaporizer seals as follows: (See figure 7-77.)

(1) Straighten tabs on forward vaporizer seal with pliers.

(2) Remove aft vaporizer seal; the forward seal ill slide out of the liner assembly.

NOTE

When installing vaporizer seal in following step (3), the key slot in the seal must face the outer diameter of the liner.

(3) Install new forward vaporizer seal in com-stion chamber liner.

(4) Support forward seal, using seal holder LTCT2070).

(5) Install aft vaporizer seal with three slots in ition to receive three tangs on forward seal.

(6) Place two pieces of feeler gage stock (0.010 h) on opposite sides of OD of aft seal, between seal ge and liner.

(7) Using staking punch (LTCT2069), bend tangs ward.

NOTE

The seals must be free to move as a unit within the liner. Clearance between the seal and liner must be 0.003 to 0.007 inch. (See figure 7-77.)

d. On liner assembly 1-130-600-03, replace worn rizer seals as follows: (See figure 7-78.)

(1) Remove retaining ring, washer, spacer, and tive seal.

(2) Replace with new seal 1-130-094-05. Install l in forward end of liner assembly and position er flange end facing liner on seal from aft end of r assembly. Secure these parts with washers and ining ring.

Replace mounting brackets that are worn beyond able limits, damaged, or distorted as follows:

(1) Remove retainer plates (6, figure 7-14) and (8).

CAUTION

When removing weld, do not grind into arent metal or liner assembly.

(2) Using hand grinder, remove mounting brackets (7) that require replacement from liner assembly.

(3) Remove vaporizer seals from three locations in liner assembly to accommodate welding fixture locating pins. (Refer to preceding steps c. or d.)

(4) Ensure that area of liner assembly to be welded is clean. Vapor-degrease replacement mounting brackets. (Refer to paragraph 7-6.)

NOTE

Welding fixture studs installed in following step (5), are part of welding fixture assembly and have oversize shanks (0.258 inch maximum) to align mounting brackets positively. A welding fixture stud is shown in detail in figure 7-79.

(5) Loosely install welding fixture studs (LTCT 783) in welding fixture (LTCT780). Place liner assembly on bench with forward end down and position welding fixture on liner assembly. (See figure 7-80.)

NOTE

Some mounting brackets installed in following step (6) may require slight rework (filing) to fit radius of liner assembly.

(6) Slide replacement mounting brackets under heads of corresponding welding fixture studs until brackets are seated against radius of liner assembly annulus. Tighten nuts to secure brackets.

CAUTION

To prevent burn-through of liner assembly during welding, concentrate bulk of heat toward mounting bracket. If necessary, back up parent metal with gas or copper.

(7) Weld mounting brackets to liner assembly with 0.040 to 0.060 inch fillets. (See figure 7-81.) Weld as much as possible without removing fixture using welding wire (item 124, table 2-2). (Refer to paragraph 7-139.)

NOTE

When completing weld in following step (8), weld fillet must not extend into opening at bracket base.

(8) Remove nuts from welding fixture studs and lift off fixture. Remove studs and complete weld. Blend weld to remove sharp shoulders at bracket corners. (See figure 7-81.)

(9) Visually and fluorescent-penetrant or dye-penetrant inspect weld as follows:

(a) Weld beads shall be reasonably smooth and free from irregularities in accordance with good

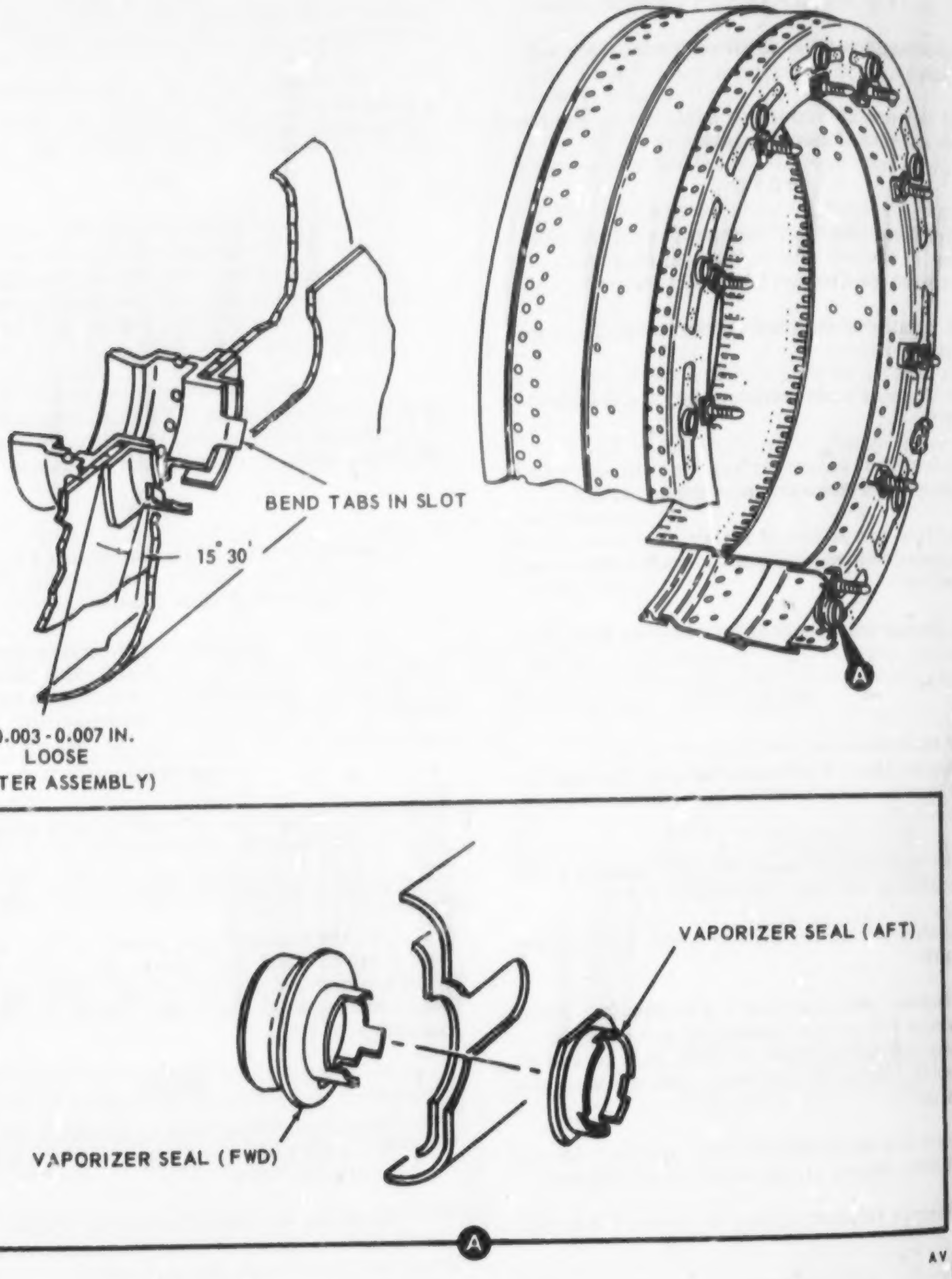

BEND TABS IN SLOT
15° 30'
0.003 - 0.007 IN.
LOOSE
(AFTER ASSEMBLY)
A
VAPORIZER SEAL (AFT)
VAPORIZER SEAL (FWD)
A
AV 003810
XA-654

Figure 7-77. Vaporizer Seal - Installation for Liner Assembly 1-130-600-01 and 1-130-600-02 (T53-L-7/7A)

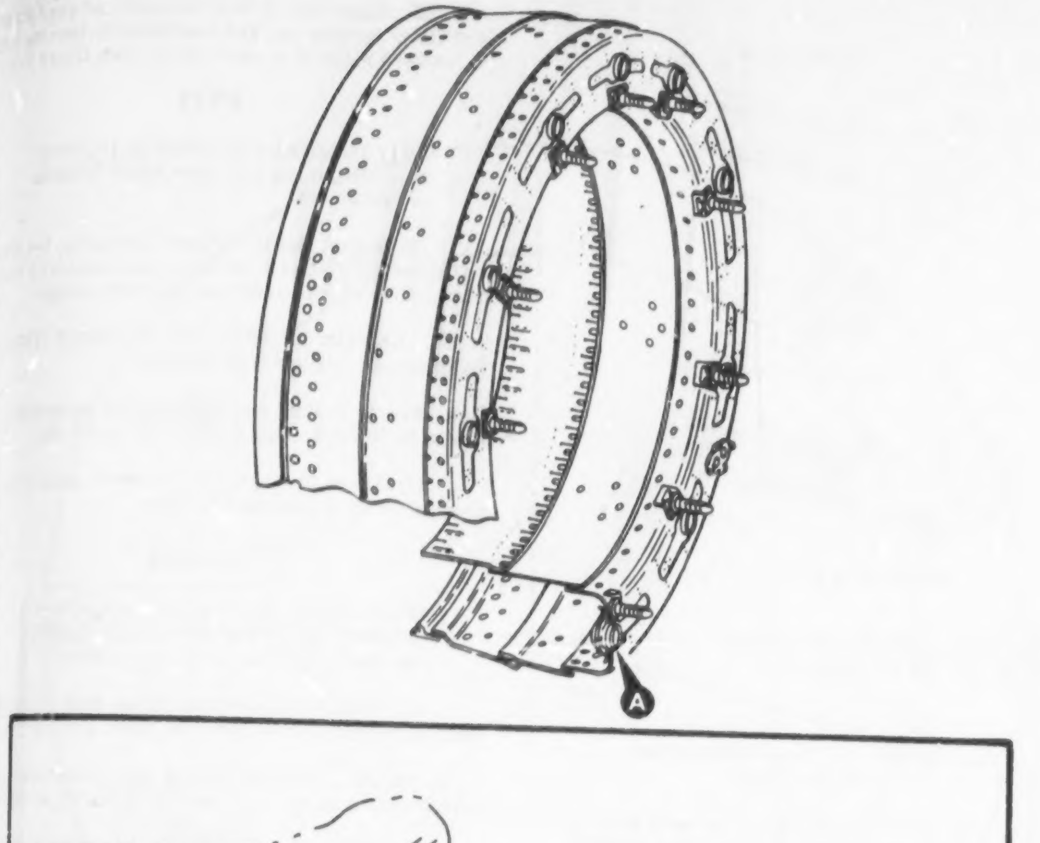
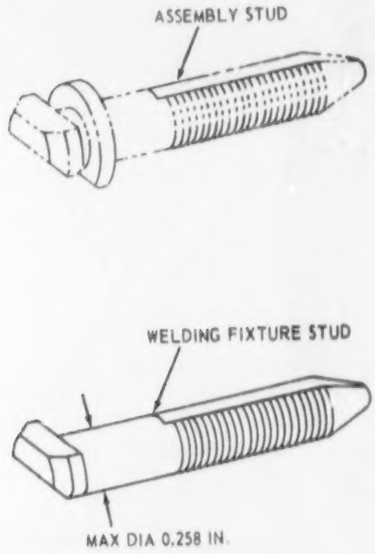

A
VAPORIZER SEAL
SPACER
WASHER
RETAINING RING
A
AV 082820
XA-894

Figure 7-78. Vaporizer Seal - Installation for Liner Assembly 1-130-600-03 (T53-L-7/7A)



NOTE:
WELDING FIXTURE STUD IS ASSEMBLY
STUD ALTERED AS INDICATED

AV 082822
XA-854

Figure 7-79. Welding Fixture Stud
(T53-L-7/7A)

aircraft quality welding practice. The weld bead shall blend into adjacent parent metal in gradual, smooth curves.

(b) Overlapping and lack of weld fusion are not acceptable.

(c) Cracks and cracklike indications are not acceptable.

(10) Install replacement studs in liner mounting brackets and secure with new retainer plates.

(11) Install replacement vaporizer seals in three locations from which original seals were removed to accommodate welding fixture. (Refer to preceding steps c. or d.)

f. Replace worn or damaged seal plates as follows: (See figure 7-82.)

(1) Remove plates by bending tangs on rear plate over sealing disc flange, using needle-nose pliers, and remove from liner assembly.

NOTE

Plates are identified (TOP LEFT HAND) and (TOP RIGHT HAND). When installing new plates, ensure that they are placed in proper location.

(2) Align tops of new forward and rear plates, identification side up, and assemble by bending tangs on forward plate over rear plate. (See figure 7-82.)

NOTE

After installation of plates in following step (3), plates will have some freedom of movement.

(3) Install plates on liner assembly, top of plat facing inside diameter of liner, and secure by bendin tangs of rear plate under sealing disc flange.

7-155. REPAIR OF EXHAUST DIFFUSER (T53-L-7/ 7A Engines). Proceed as follows:

a. Repair cracks and dents within permissible limits as follows: (See figure 7-83 and 7-84.)

(1) Using fine abrasive, remove paint from cracked area of painted diffusers.

CAUTION

Where more than one thickness of metal is present, be careful not to drill through second thickness in following step (2).

(2) Using 1/16-inch diameter drill, stop-drill ends of cracks except those in outer strut fairing.

b. Repair dents that create gap greater than 1/1 inch between outer strut and strut fairing as follow

(1) Using fine abrasive or vapor-blast, remo paint from dented areas of painted diffusers.

(2) Using rubber or leather-headed mallet, deform flange or strut fairing as close to outer st as possible.

(3) Tack-weld threaded end of 1/4 inch dia by one inch long low alloy steel hex head bolt to ce of dent by inert-gas temperature method, using we ing wire (item 123, table 2-2). Tack welds shall be approximately 0.045 inch long and 180 degrees sp

(4) Apply outward pressure under head of b until dented area conforms (after pressure is relea to contour of undamaged strut and strut fairing ar adjacent to dent.

CAUTION

During grinding in following step (5), do not reduce strut wall thickness.

(5) Remove bolt by grinding away tack wel

(6) Visually inspect repaired areas to ensu that strut and strut fairing mating surfaces are w within allowable limits.

(7) Repaint repaired surface. (Refer to para 7-142.)

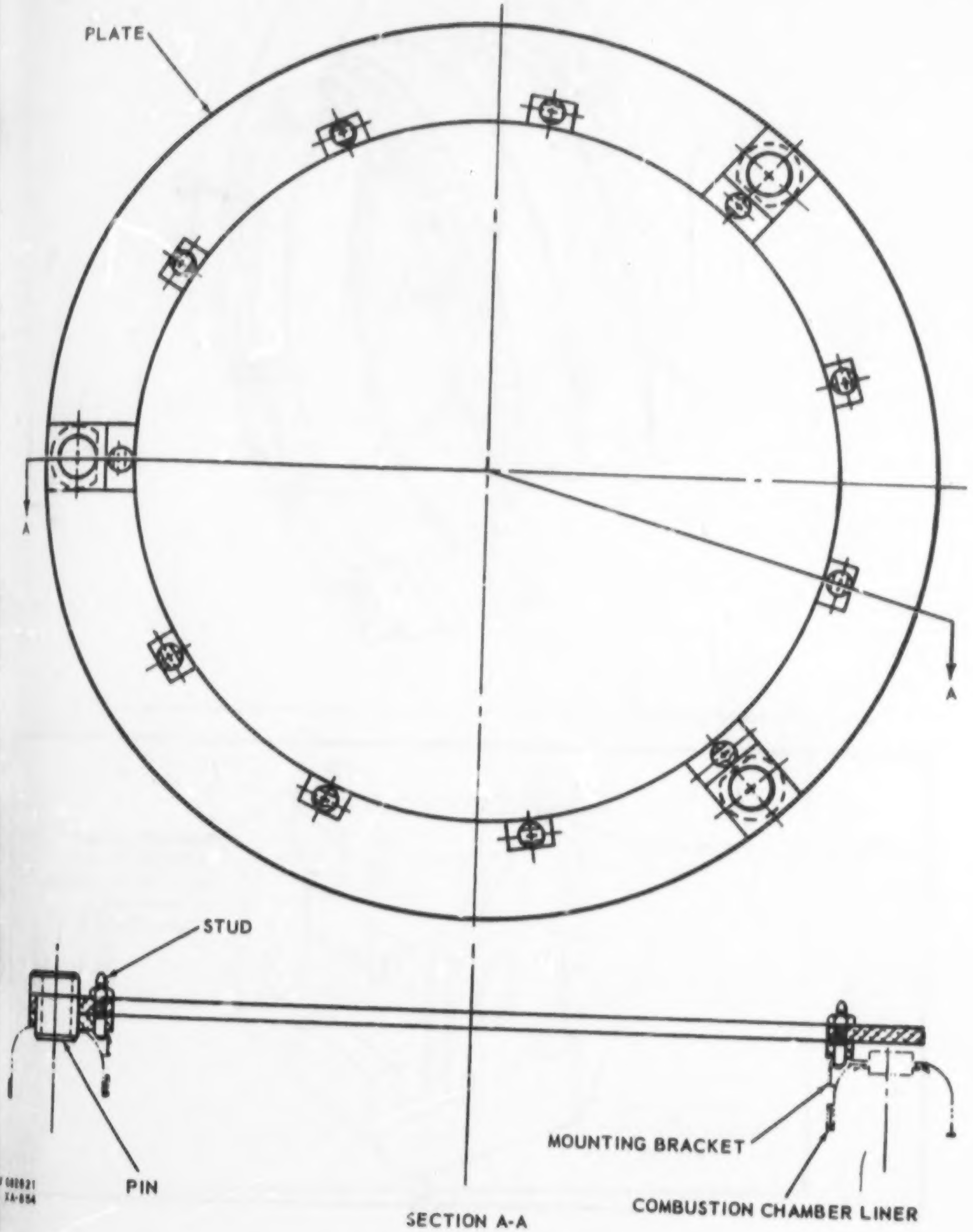


PLATE
A
A
STUD
PIN
MOUNTING BRACKET
COMBUSTION CHAMBER LINER
SECTION A-A
080821
XA-654

Figure 7-80. Welding Fixture Installed (T53-L-7/7A)

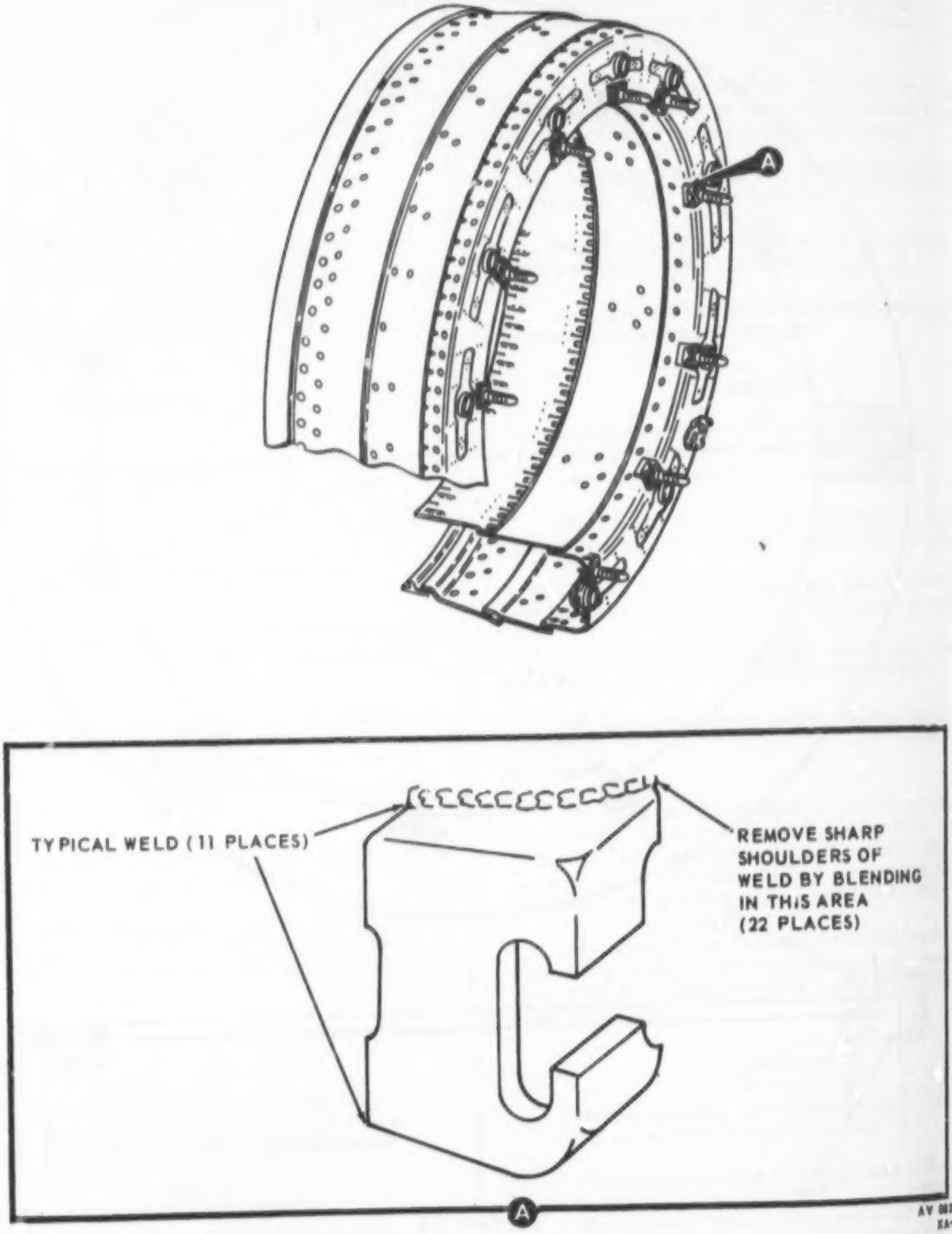

A
TYPICAL WELD (11 PLACES)
REMOVE SHARP SHOULDERS OF WELD BY BLENDING IN THIS AREA (22 PLACES)
A

Figure 7-81. Mounting Bracket Weld (T53-L-7/7A)

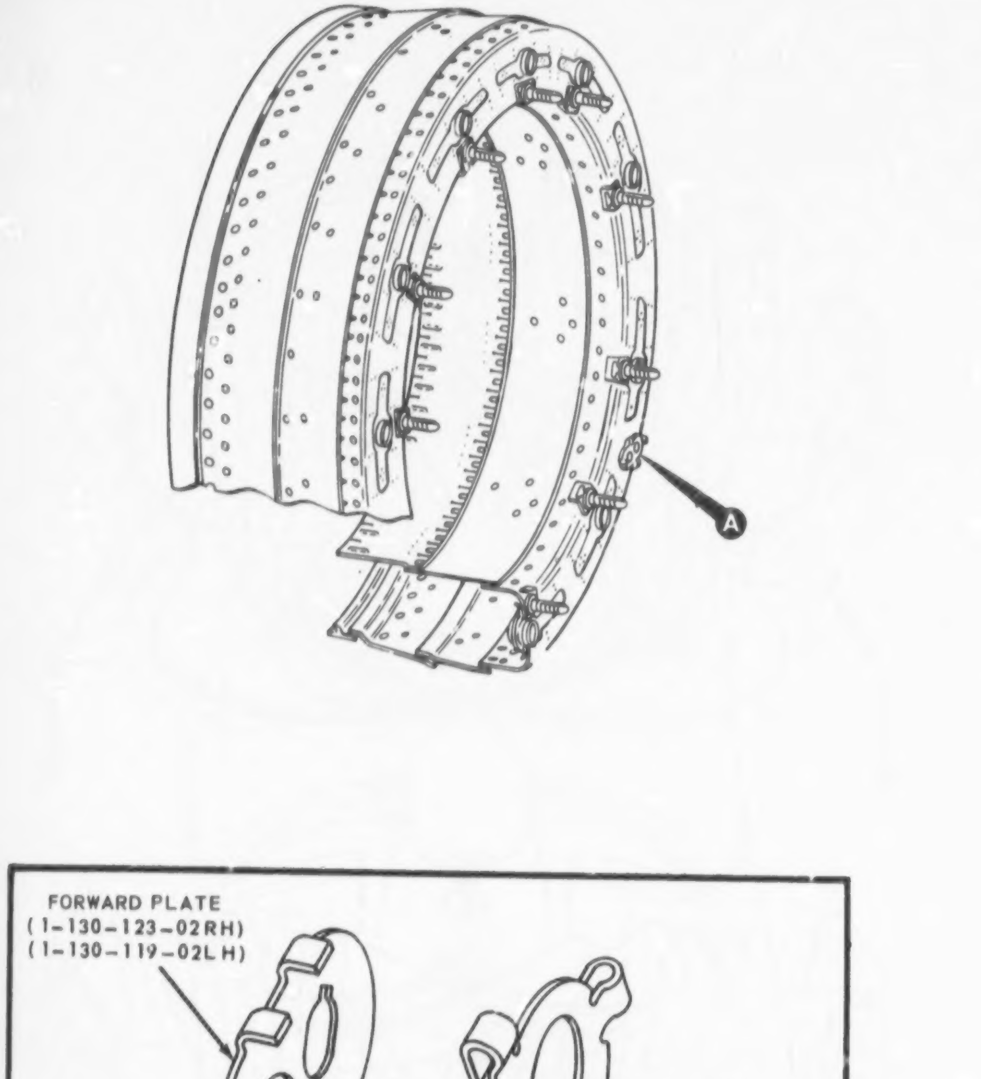

A
FORWARD PLATE
(1-130-123-02RH)
(1-130-119-02LH)
REAR PLATE
(1-130-121-02RH)
(1-130-136-01LH)
A
AV 082824
XA-854

Figure 7-82. Seal Plates Installation (T53-L-7/7A)

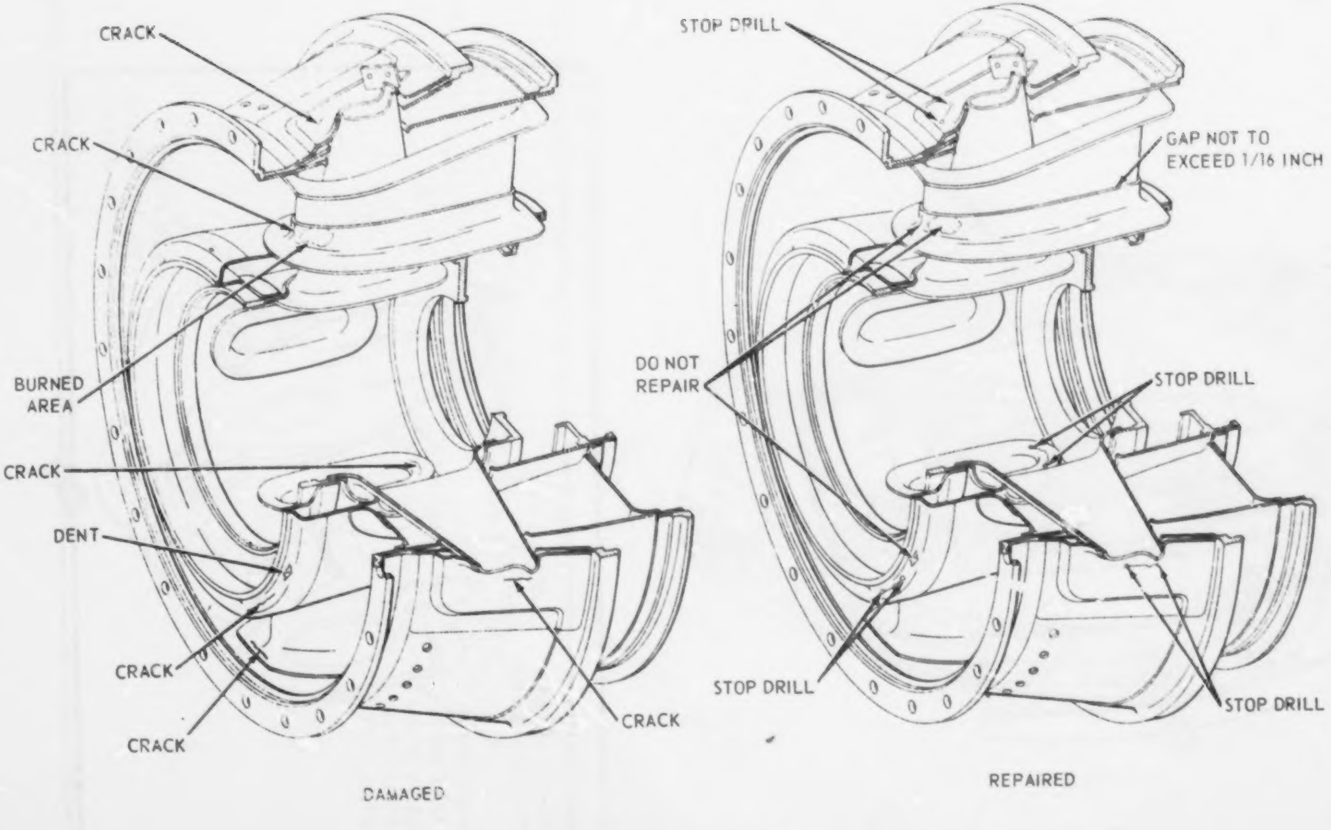

CRACK
CRACK
BURNED AREA
CRACK
DENT
CRACK
CRACK
CRACK
DAMAGED
STOP DRILL
GAP NOT TO EXCEED 1/16 INCH
DO NOT REPAIR
STOP DRILL
STOP DRILL
STOP DRILL
REPAIRED
AV 082825
X-854

Figure 7-88. Exhaust Diffuser - Before and After Repair (T53-L-7/7A)

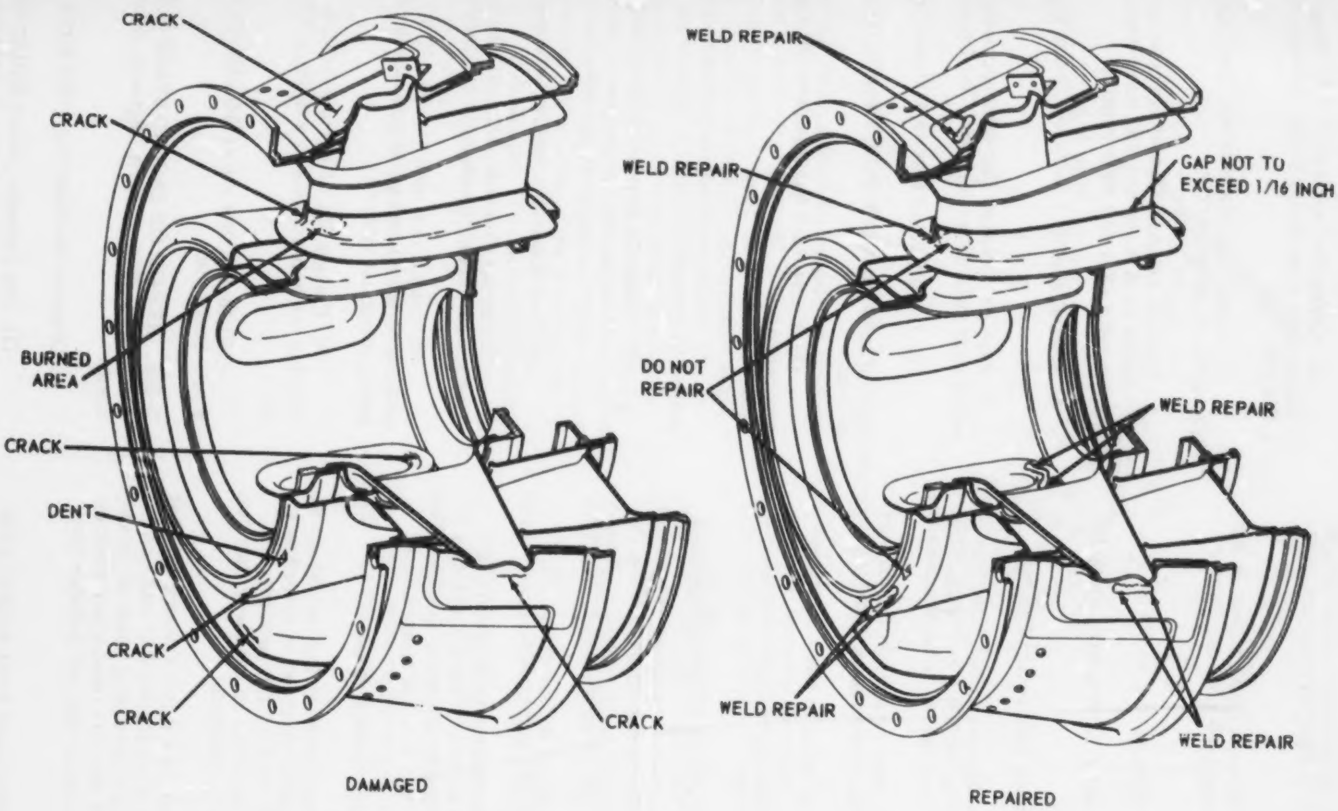

CRACK
CRACK
BURNED AREA
CRACK
DENT
CRACK
CRACK
CRACK
DAMAGED
WELD REPAIR
WELD REPAIR
GAP NOT TO EXCEED 1/16 INCH
DO NOT REPAIR
WELD REPAIR
WELD REPAIR
WELD REPAIR
REPAIRED
AV 082326
X-854

Figure 7-84. Exhaust Diffuser - Before and After Repair (T53-L-7/7A)
(General Support Maintenance)

NOTE

Following steps c. through e. do not apply to stainless steel exhaust diffuser 1-150-200-01.

c. Make the following weld repairs to the exhaust diffuser inner strut, inner flange, and support flange. (See figure 7-84.)

(1) All cracks on forward face of inner cone and outer strut fairing shall be routed out prior to weld repair.

(2) Preheat crack area to 350° to 400°F.

(3) Weld cracks, using welding wire (item 123, table 2-2).

(4) Blend-repair area with rotary file.

(5) Stress-relieve diffuser at 500°F for one hour at temperature buildup of 200°F per hour. Cool down gradually to 400°F and then to room temperature.

d. Make the following weld repairs to the exhaust diffuser in all other areas. (See figure 7-84.)

(1) Cracks up to 2 inches in inner strut support plate shall be weld-repaired; however, accumulated total length of all cracks shall not exceed 4 inches.

(2) Strip paint from area to be weld-repaired.

(3) Rout out cracks to be weld-repaired.

(4) Weld cracks with welding wire (item 123, table 2-2).

(5) Blend cracks with rotary file.

(6) Place exhaust diffuser in fixture (LTCT 324) and stress relieve at 1100°F for 2 hours at a temperature buildup of 200°F per hour. Cool down gradually to 400°F and then to room temperature.

(7) Remove diffuser from fixture.

(8) Cracks in inner strut fairing that do not exceed 4 inches shall be weld-repaired in accordance with preceding steps (2) through (7); however, not more than two cracks per strut on not more than two struts per diffuser are permissible.

(9) Cracks in inner strut outer perimeter that do not exceed 2 inches in length shall be weld-repaired in accordance with preceding steps (2) through (7); however, not more than two cracks per strut on not more than two cracked struts per diffuser are permissible.

(10) Cracks between inner strut support plate and inner strut outer perimeter that do not exceed 3 inches shall be weld-repaired. In this case, a crack that exceeds 2 inches in inner strut outer perimeter is cause for rejection of diffuser.

e. After weld repair, check diffuser for distortion and concentricity as follows:

(1) Using suitable faceplate or engine lathe, check mounting bolt hole flange (surface A, figur 7-18) for flatness of 0.002 inch TIR.

(2) Check that surface of rear flange (surface B) is parallel to mounting flange (surface A) within 0.002 inch TIR.

(3) Check that diameters C and D are concentric within 0.003 inch TIR.

f. Replace exhaust diffuser if cracks or burns exceed limits or if distortion and concentricity limits are exceeded after any weld repair.

g. Repaint repaired surface. (Refer to paragrap 7-142.)

h. Replace damaged thermocouple mounting stud on exhaust diffuser as follows: (See figure 7-84A.)

(1) Cut off stud close to surface of boss.

(2) Using center drill, start hole in remainde of stud.

(3) Using No. 8 carbide drill, drill into stud approximately 0.150 inch below face of boss (cuttin through lockpin).

(4) Using punch, drive part of lockpin into ho drilled in preceding step (3). Remove pin.

(5) Using No. 43 carbide drill, drill through isting pin hole and into remainder of pin in opposit wall of stud, to a depth of approximately 0.380 inc

(6) Using suitable tool, remove stud from b

(7) Retap stud hole, using a 1/4 x 28 UNF-3 bottom tap. Clean threads with compressed air.

(8) Install new stud (1-150-007-01) and tigh to 70 to 95 pound-inches torque. Ensure that stud bottoms against cone OD.

(9) Using a No. 43 carbide drill, drill throu existing pin hole in boss to a depth of 0.255 to 0.2 inch.

(10) Install new pin (1-140-285-01) flush wi boss. Stake pin.

7-156. REPAIR OF SECOND STAGE TURBINE R ASSEMBLY (T53-L-7/7A Engines). Proceed as fo lows:

a. Observe the following rules during repair.

(1) Use portable power drill or rotary file equipped with carbide burr. If these are not avai able, small diesinker type file or India or carbo dum stone may be substituted.

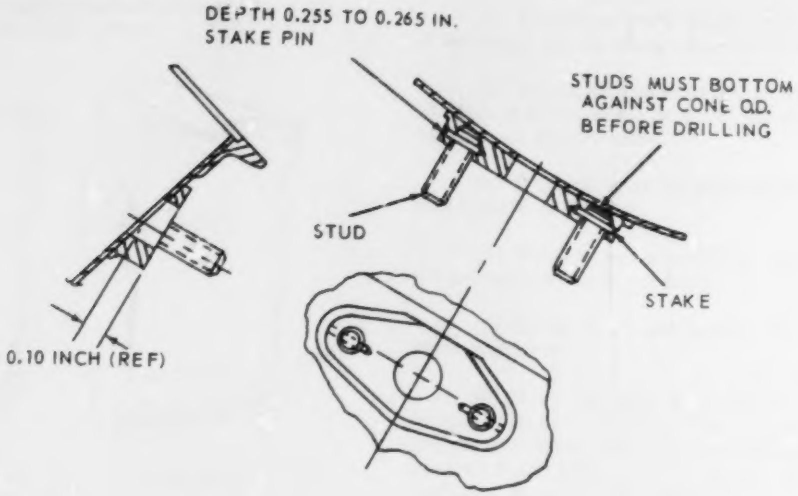


Figure 7-84A. Exhaust Thermocouple Mounting Stud Replacement (T53-L-7/7A)

(2) Finish strokes shall be parallel to leading d trailing edges of blades.

(3) Final polishing of area shall be made with cus cloth (item 23, table 2-2). All repairs shall blended and finished smoothly.

(4) Leading or trailing edge repairs shall be nded to smooth radius as part of repair. (See fig- 7-85.)

(5) Reworking disc area, when touchup paint- is required, may be accomplished by lightly ding area with sandpaper. Brush or cloth shall sed to paint areas. Air dry with warm air or infrared lamp at minimum of 30°F above ambient perature for one hour.

. Leading and trailing edge repair limits are as ws:

NOTE

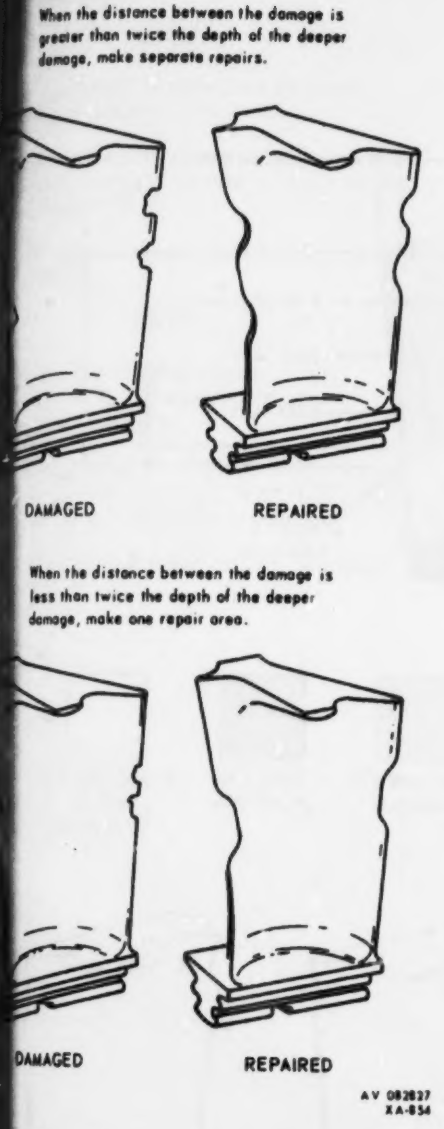
Finish repair length shall be blended to a minimum of three times depth of damage.

(1) The maximum permissible finished repair depth is 0.125 inch from leading edge and 0.090 inch from trailing edge at shroud end of blade. Allowable depths decrease as distance between damage and Point A on leading edge and Point B on trailing edge decreases. (See figure 7-86.)

(2) Round-bottom dents, 0.010 inch or less deep, require removal of sharp edges only.

(3) When distance between damage and shroud end of blade is less than twice the depth of damage, extend repair to include shroud end.

(4) When distance between two damaged areas is less than twice the depth of the deeper damage, make


When the distance between the damage is greater than twice the depth of the deeper damage, make separate repairs.
DAMAGED
REPAIRED
When the distance between the damage is less than twice the depth of the deeper damage, make one repair area.
DAMAGED
REPAIRED
AV 082837
XA-854

re 7-85. Second Stage Turbine Blade
- Before and After Repair (T53-L-7/7A)

d repair area. When distance between
reas is greater than twice the depth of the
mage, make separate blade repair areas.
e 7-85.)

c. Blade surface area repair limits are as follows:

(1) Maximum permissible decrease in thickness at any point on the blade shall be 0.010 inch.

(2) Maximum permissible finished single repair on blade surface shall be 0.200 square inch on either concave or convex side.

(3) Repairs shall be blended to minimum of twice depth of damage.

(4) Total repaired surface area shall not exceed ten percent of blade surface.

(5) Repairs are not allowed within 0.500 inch of blade platform.

(6) When distance between two damaged areas is less than twice depth of the deeper damage, make one repair. When distance between damaged areas is greater than twice depth of deeper damage, make separate repairs. (See figure 7-85.)

d. Shroud end, blade root, blade platform, and second stage turbine disc repair limits are as follows:

NOTE

Scoring along the shroud end is caused by the blade rubbing against the cylinder and may be distinguished by localized burring similar to file marks.

(1) Maximum score depth at shroud end is 0.010 inch along one-half blade width.

(2) No repairs are permitted in blade root or blade platform areas.

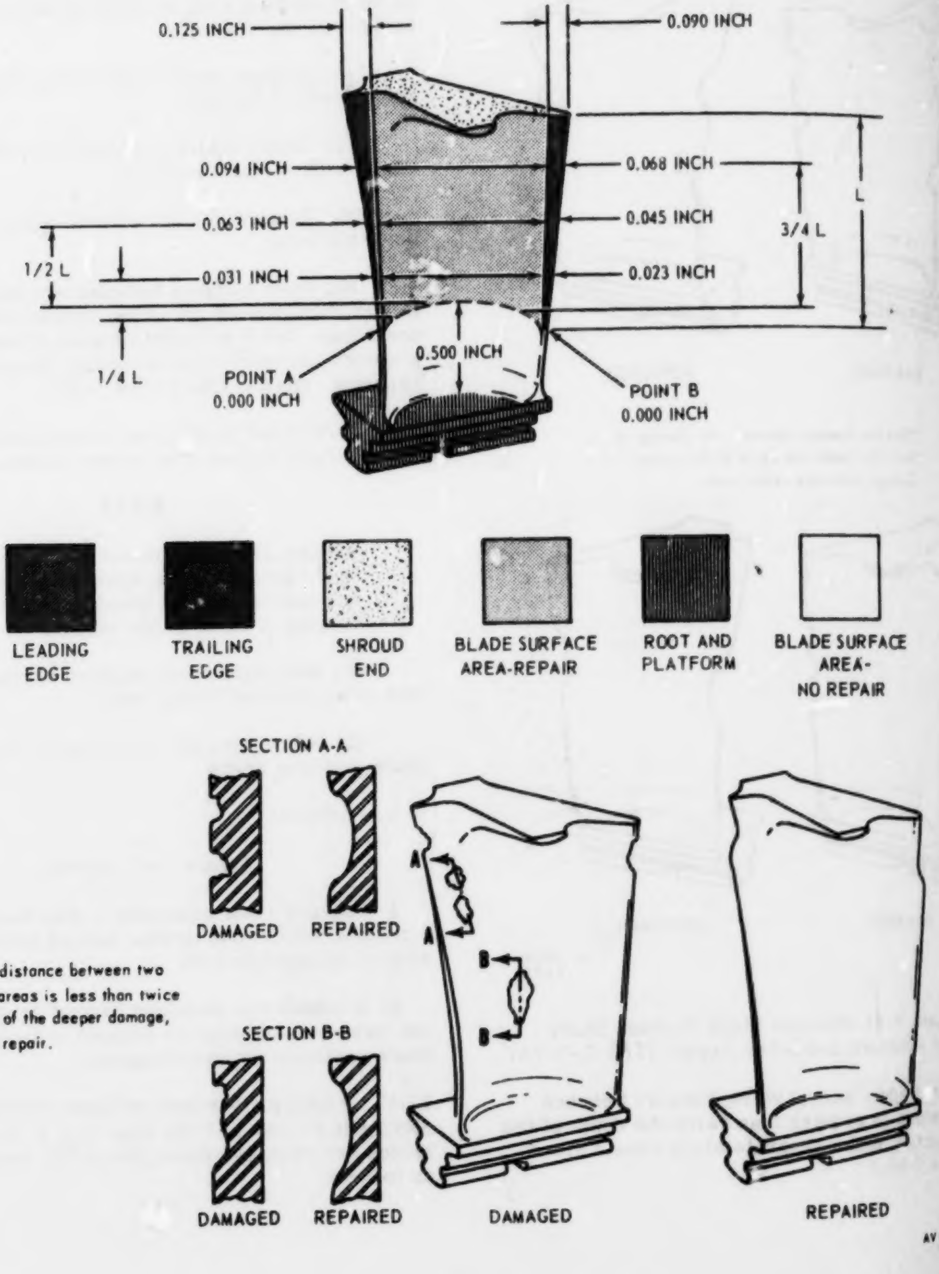
e. (Deleted)

Figure 7-87 deleted.

f. Replace rotor assembly if disc is cracked or if circumferential rubs on disc exceed limits stated in step e., paragraph 7-49.

g. If blades are damaged beyond established limits, the turbine rotor must be shipped to Overhaul for blade replacement and balancing.

7-157. REPAIR OF FIRST STAGE TURBINE ROTOR ASSEMBLY (T53-L-7/7A Engines). If one or more blades are recessed more than 0.025 inch, reseat as follows:


0.125 INCH
0.090 INCH
0.094 INCH
0.068 INCH
0.063 INCH
0.045 INCH
0.031 INCH
0.023 INCH
1/2 L
3/4 L
L
1/4 L
0.500 INCH
POINT A
0.000 INCH
POINT B
0.000 INCH
LEADING EDGE
TRAILING EDGE
SHROUD END
BLADE SURFACE AREA-REPAIR
ROOT AND PLATFORM
BLADE SURFACE AREA-NO REPAIR
SECTION A-A
DAMAGED
REPAIRED
SECTION B-B
DAMAGED
REPAIRED
A
A
B
B
DAMAGED
REPAIRED

When the distance between two damaged areas is less than twice the depth of the deeper damage, make one repair.

Figure 7-86. Second Stage Turbine Blade Repair Limits (T53-L-7/7A)

. Blade Reseating.

NOTE

Number one blade is identified by punch marks on both sides of pin hole.

(1) Locate and mark number 1 blade on both s using marking pencil (yellow) Colorbrite No. 7 (item 72, table 2-2).

(2) Place rotor, forward face up, in removal re (LTCT548).

NOTE

Ensure that blade being tapped in following step (3) is not positioned over slot in holding fixture.

(3) Starting at number 1 blade in clockwise tion and, using hammer and drift (LTCT552), ll blades flush with forward face of disc.

(4) If recessed pin 1-140-023-01 is installed, eed as follows:

(a) Using hammer and drive punch, redrive all pins.

(b) Place rotor on holding fixture with forward face down.

(5) If mushroomed pin 1-140-023-05 is installed, proceed as follows:

CAUTION

Staking tool must be held firmly on head of pins to prevent damage to pins. Ensure that tool does not contact disc during staking operation.

(a) Place staking tool (LTCT2094) on disc and redrive all pins until mushroomed heads do not exceed 3/32 inch in height.

(b) Remove staking tool (LTCT2094) and place rotor on holding fixture with forward face down.

b. Wedge Reseating.

NOTE

If wedges protrude above rear face of disc, use drift (LTCT552) for initial driving. Wedge may be redriven to 0.150 inch below the rear face of disc provided wedges 180 degrees opposite are within 0.050 inch of being equally driven.

(1) Beginning with number 1 blade wedge, consecutively redrive all wedges in clockwise direction, using hammer and drift ground to fit end of wedge. Use only enough force to seat wedges firmly in slots.

(2) Replace wedges which are not within these limits.

(3) Using drift (LTCT552), stake forward end of wedges toward center of turbine disc at 45 degree angle.

CAUTION

Do not grind or file disc or blade roots in following step (4).

(4) Grind or file protruding wedges to within 0.005 inch of face of disc.

7-158. REPAIR OF AIR DEFLECTOR AND COMBUSTION CHAMBER DEFLECTOR (T53-L-7/7A Engines.) Combustion chamber deflector cracks in or next to inner seam weld which are in excess of 180 degrees, but less than 300 degrees, shall be repaired as follows:

a. Tack-weld each end of cracks in excess of 30 degrees.

(1) Whenever possible provide additional tack welds, equally distributed, to maintain alignment for fusion welding.

(2) On open cracks 1/8 inch or more in width, tack weld only at crack ends. Diminish crack opening by pushing halves together, using vise clamps or blocks.

b. Fusion-weld between tack-welds, using filler material specified in table 7-9.

c. Repair cracks in inner flange (bolt hole ring [illegible] surrounding parent metal) by fusion-welding process using filler material listed in table 7-9.

7-159. SKIMMING PROCEDURE FOR FIRST STA TURBINE NOZZLE FLANGE (T53-L-7/7A Engines) To obtain allowable minimum tip clearance between first stage turbine wheel assembly and first stage turbine flange, rework flange using first stage turbine flange-finishing maintenance kit (LTCT[illegible]). (See figure 7-88.)

a. Locate longest turbine rotor blade as follow

(1) Insert a feeler gage (Starrett Number 172 taper or equivalent) between first stage turbine blad tips and turbine nozzle flange at 12-o'clock position

(2) The blade with least tip clearance at this position will be longest blade in the rotor assembly

CAUTION

Do not use lead pencil to mark blades in following step (3).

(3) Mark longest blade with marking pencil (yellow) Colorbrite No. 2107 (item 72, table 2-2) so that it can be recognized during succeeding operat

(4) Check clearance between tip of longest bl and flange at seven additional positions. (See figure 3-19.) Hold feeler gage stationary at each position turn rotor one full turn. If tip clearance at any po is 0.025 inch or less, flange must be reworked. No position of least tip clearance.

Table 7-9. Combustion Chamber Deflector Assembly - Weld Filler Material (T53-L-7/7A)

NOMENCLATURE	DETAIL OF PART NUMBER	FILLER MATERIAL
Deflector	1-110-020-01	Welding Wire (item 122, table 2-2)
Deflector	1-110-020-02	Welding Wire (item 122, table 2-2)
Deflector	1-110-020-06	Alloy Wire (item 124, table 2-2)
Inner Flange	All	Welding Wire (item 121, table 2-2)
Outer Flange	All	Welding Wire (item 121, table 2-2)

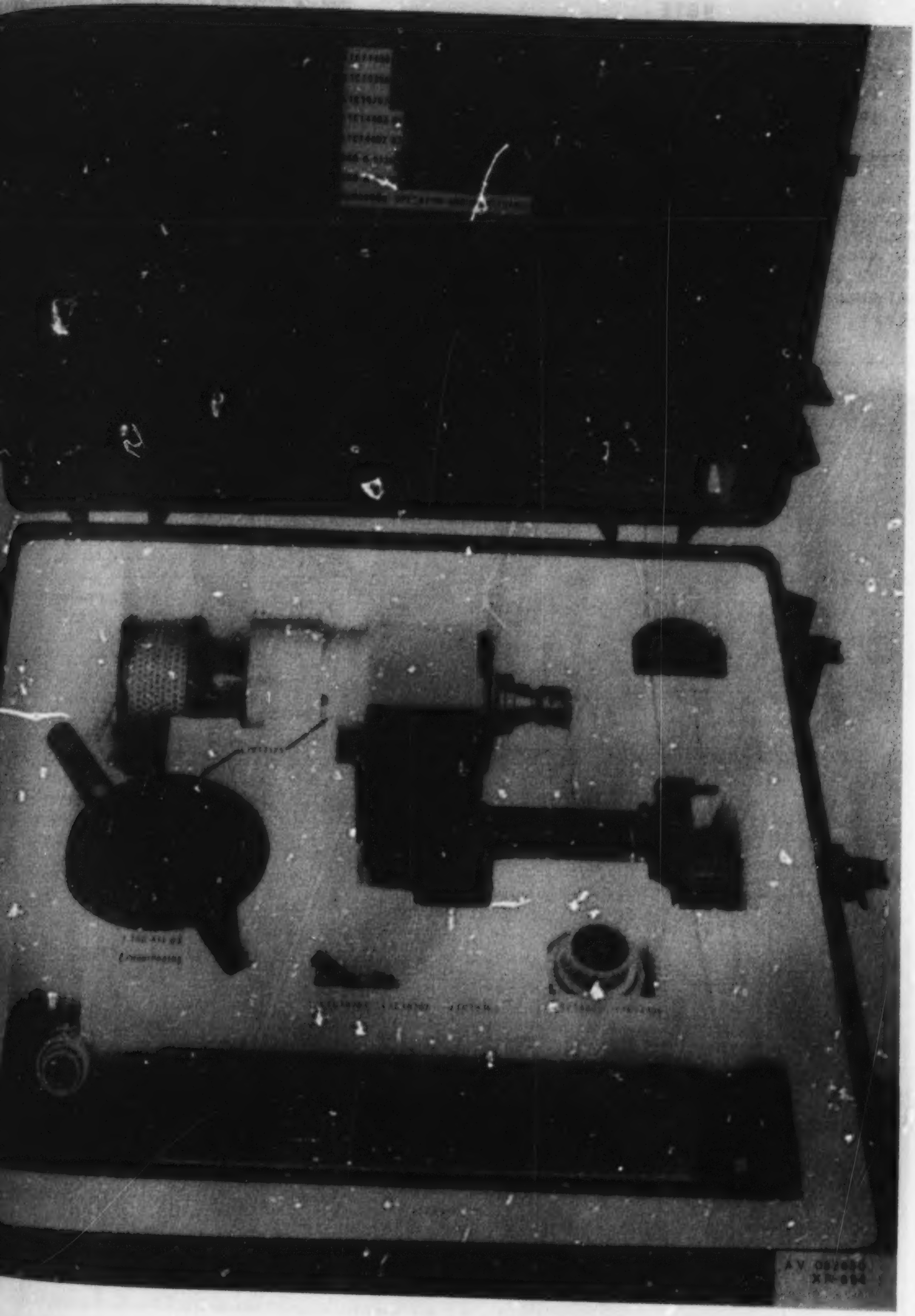


Figure 7-88. First Stage Turbine Flange-Finishing Maintenance Kit (LTCT2020)

NOTE

Minimum acceptable tip clearance at inspection is 0.025 inch. However, when rework is to be accomplished, it is suggested that a tip clearance of 0.032 inch be established.

b. Locate areas to be reworked as follows:

(1) Insert 0.032-inch feeler gage between tip of longest blade and turbine nozzle flange as near as possible to area of least tip clearance.

(2) Rotate turbine wheel and feeler gage together until stopped by an area of less clearance. (See figure 7-89.)

(3) At stopping point, mark edge of nozzle fla with marking pencil (yellow) Colorbrite No. 2107 (item 72, table 2-2).

(4) Remove feeler gage and turn rotor until l blade is past high point far enough to allow the 0.0 inch feeler gage to be inserted.

(5) Reinsert feeler gage between long blade turbine nozzle flange.

(6) Rotate turbine wheel and feeler gage togeth in the reverse direction, until stopped by an area less clearance.

(7) Mark turbine nozzle flange as before a connect the two marks to show area to be reworke

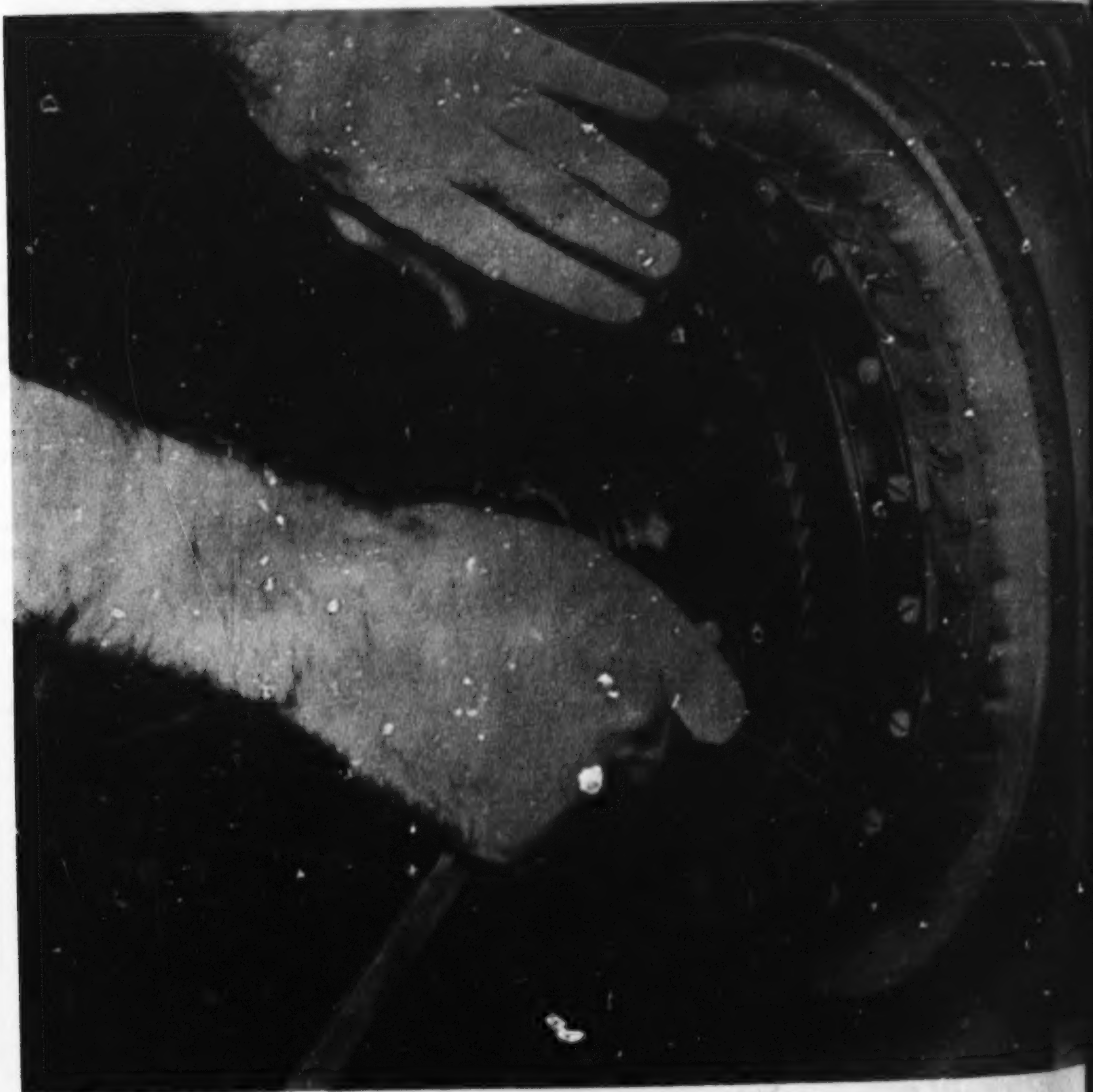


Figure 7-89. Locating Turbine Flange Areas To Be Reworked

(8) Repeat preceding steps (1) through (7) until areas that must be reworked have been located.

NOTE

When removing first stage turbine rotor assembly in following step c., do not remove compressor turbine rear cone (2, figure 3-21.)

c. Remove first stage turbine rotor assembly. (Refer aragraph 3-48.) Do not discard compressor shaft bearing lockring (3, figure 3-21.)

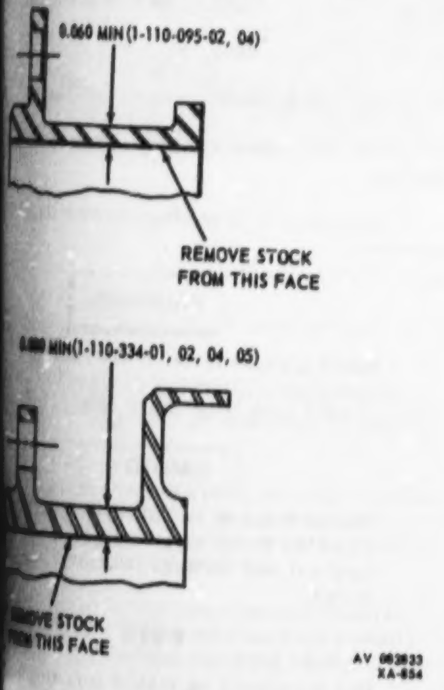
d. Check wall thickness of flange at points indicated rework. If thickness is less than that shown in 7-90, or if removal of material necessary to required tip clearance will decrease wall thick- to less than that shown, replace turbine nozzle .

stall first stage turbine nozzle flange-finishing (LTCT2125) as follows:

(1) Install protective cover (LTCT4408, detail of 2020) by placing large end over flange of air and small end over nozzle. (See figure 7-91.)

NOTE

The garter spring installed in following step (2) aids in producing a good finish by reducing resonance and dampening vibration during milling operation.


0.060 MIN (1-110-095-02, 04)
REMOVE STOCK FROM THIS FACE
MIN(1-110-334-01, 02, 04, 05)
VE STOCK
THIS FACE
AV 002833
XA-654

gure 7-90. Turbine Nozzle Flange Rework Limits

(2) Install garter extension spring (LTCT9396, detail of LTCT2020) on nozzle flange. (See figure 7-91.)

(3) Cut lockwire and remove air deflector retaining screw from each of 3-, 7-, and 11-o'clock positions. (See figure 7-92.)

(4) Slide finishing machine onto stub shaft (this requires two men). Insert captive screws into open screw holes and tighten finger-tight.

(5) Ensure bushing and adapter are free on shaft.

(6) Push machine forward until shaft contacts compressor turbine forward cone.

NOTE

If difficulties are encountered during installation of cone and retaining nut in following step (7), raise rear end of arbor slightly to make it concentric with stub shaft.

(7) Install compressor turbine rear cone 1-110-411-03 furnished with kit, using sleeve bushing (LTCT 4406, detail of LTCT2020) and shouldered shaft (LTCT 4405, detail of LTCT2020). (See figure 7-93.)

(8) Install bearing retaining spanner nut. (See figure 7-94.) Tighten nut to 700 to 800 pound-inches (56 to 66 pound-feet) torque with face spanner wrench (LTCT4450, detail of LTCT2020). Use spanner wrench (GGG-W-665B, Type II) to prevent rotor shaft from turning during tightening operation. (See figure 7-95.)

(9) Tighten captive screws in finishing machine adapter to 75 to 80 pound-inches torque.

(10) Tighten bushing (no torque value) with spanner wrench (LTCT4402-02, detail of LTCT2020) furnished with machine. (See figure 7-96.)

(11) Mask openings and bearing area with tape. (See figure 7-97.)

(12) Install finishing machine balance shaft and weight (LTCT4389 and LTCT4388, detail of LTCT2125). Secure with lock pin. (See figure 7-98.)

NOTE

The grinder must be held firmly by aft end in following step (13). Turning entire machine clockwise will move grinder forward axially (toward front of engine). Turning counterclockwise will move grinder toward aft end of engine.

(13) Hold grinder (figure 7-97) firmly and turn machine counterclockwise until feed reaches aft stop.

(14) Install cutter (LTCT9261, detail of LTCT 2020) in collet of grinder. The collet must be tight enough to prevent cutter from moving freely but loose enough to permit it to be moved by hand. Back of cutter head must not be more than one inch from collet.

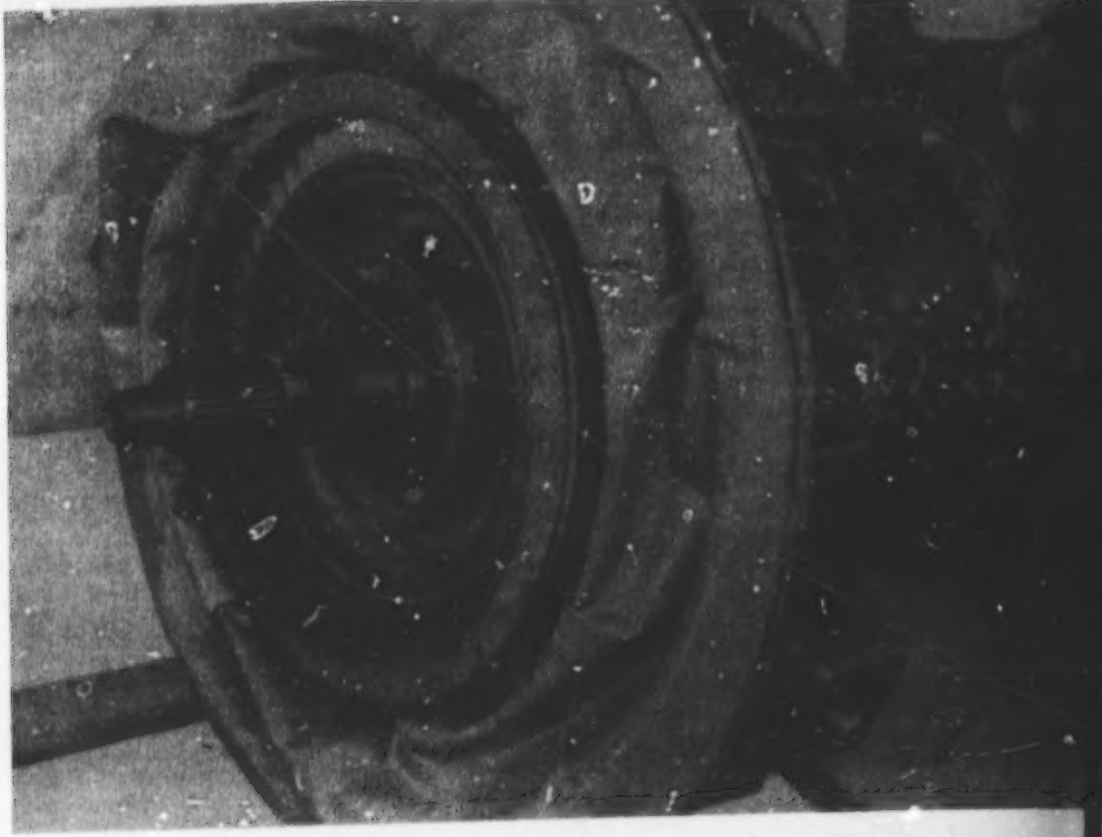


Figure 7-91. Protective Cover and Garter Spring Installed

(15) Hold grinder by base and turn machine clockwise until feed reaches forward stop.

CAUTION

If cutter extends beyond forward edge of flange in following step (16), it will damage nozzle vanes during cutting operation.

(16) Adjust cutter to reach forward edge of flange and tighten collet, using spanner wrenches (LTCT9263, detail of LTCT2020). (See figure 7-98.)

NOTE

To obtain satisfactory finish, the following rules must be obeyed:

Do not use a tool that vibrates (i.e., does not run true.)

Do not extend a 1/4-inch shank tool more than one inch of shank beyond collet.

(17) Hold grinder, as before, and withdraw cutter by turning machine counterclockwise until grinder reaches aft stop.

(18) Check collet to ensure tightness.

(19) See figure 7-97 for installed flange machine.

f. Operation of first stage turbine flange machine.

WARNING

Safety glasses must be worn during operation of finishing machine to protect eyes from flying chips.

CAUTION

The first cut should always be shallow, since the flange may be tapered. A deep first cut may damage the cutter and/or flange.

NOTE

One increment on dial of adjusting hand will advance cutter radially approximat 0.001 inch.

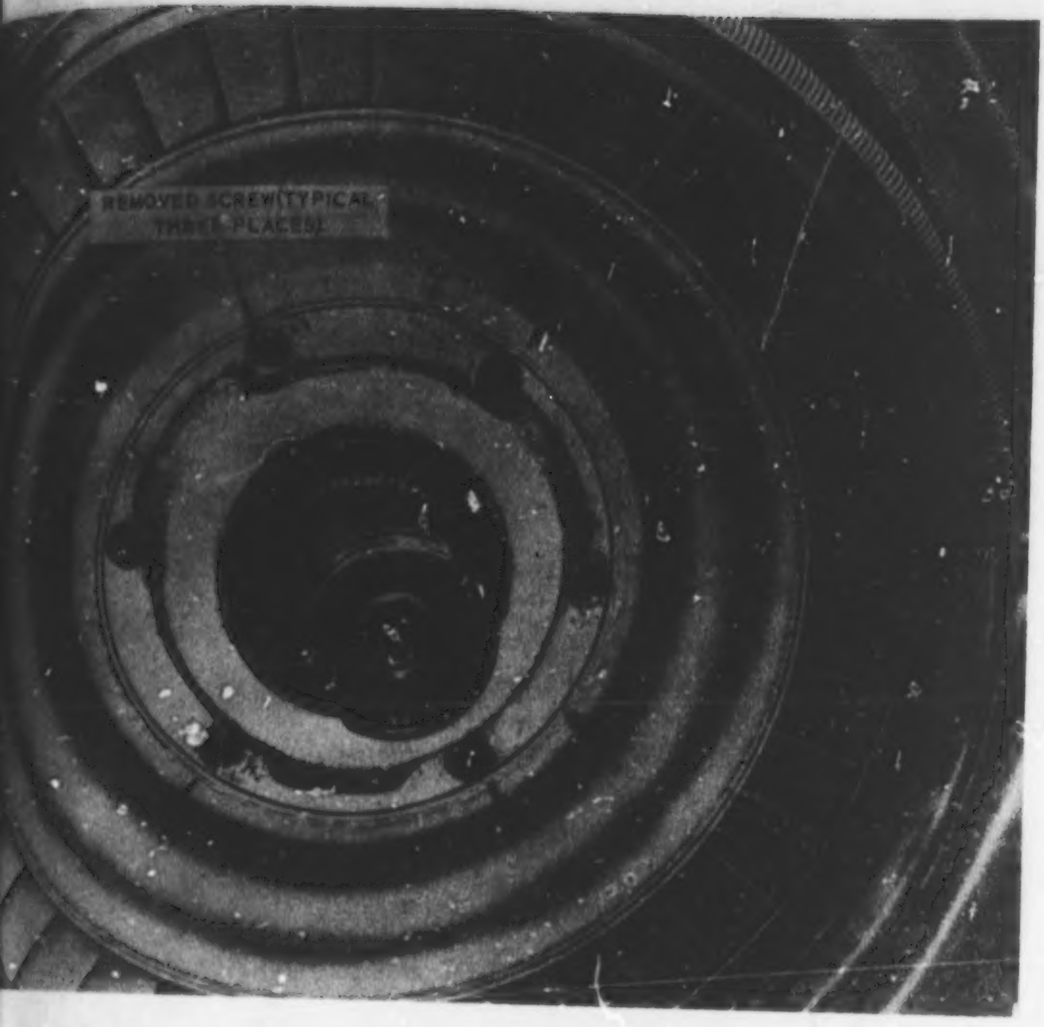


Figure 7-92. Air Deflector Screws Removed (T53-L-7/7A)

Advance grinder until at least one-half of
within flange.

Station cutter at area of minimum tip clear-
point) indicated by markings on edge of

Advance cutter radially by turning adjusting
figure 7-99) until cutter just contacts inner
flange; then sweep cutter around flange to
ment to the highest point.

Turn finishing machine counterclockwise
is clear of flange; then advance radially
inch by turning adjusting handle clock-

NOTE

Electric power required is 110-120 volts ac, 15 amperes, 50-60 cycles.

(5) Install electric power cable from grinder to control box and connect control box to power source. The round prong on plug is the ground. If socket has no ground connection, switch ground prong to one side and wire it to plate screw in junction box.

(6) (Deleted)

(7) Start grinder. Wait approximately 10 seconds until it reaches maximum speed. Slowly sweep cutter clockwise around flange until forward stop is reached.

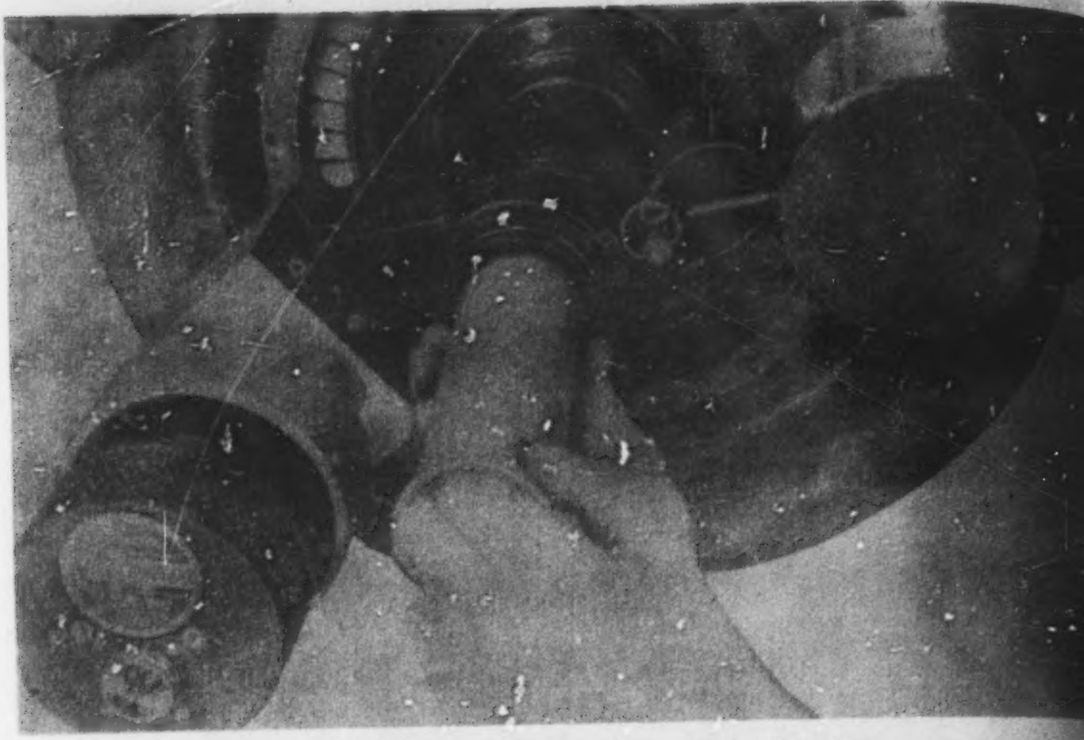


Figure 7-93. Installing Compressor Turbine Rear Cone

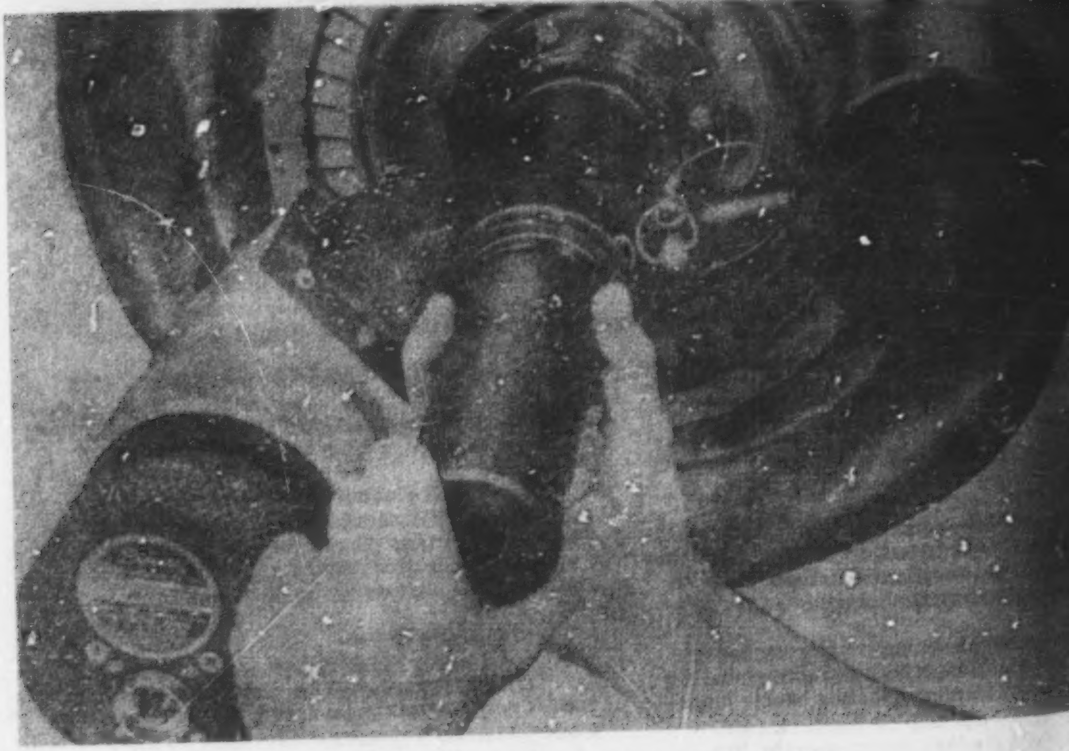


Figure 7-94. Installing Bearing Retaining Nut

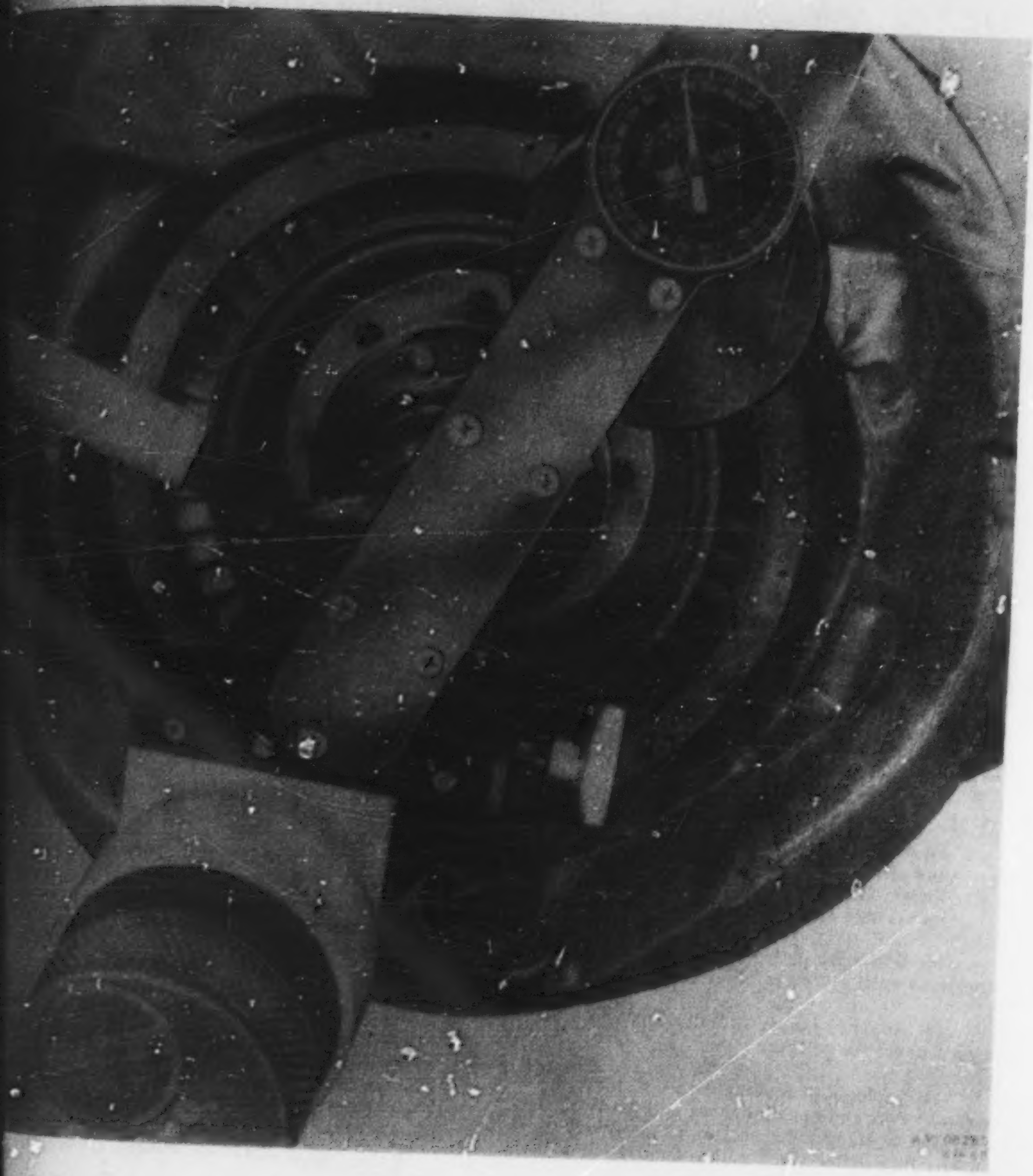


Figure 7-95. Tightening Bearing Retaining Nut

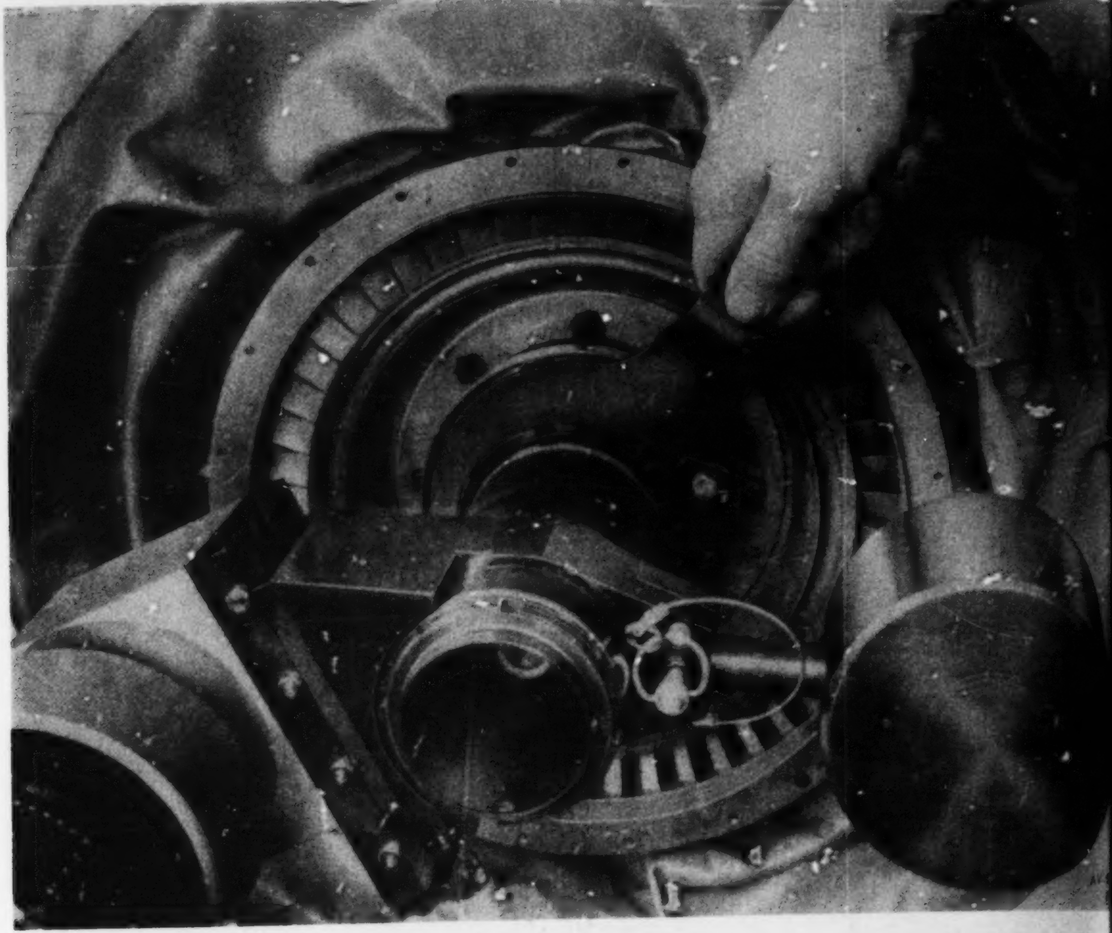


Figure 7-96. Tightening Adapter Bushing

CAUTION

Do not halt sweep between stops (forward and aft) while cutter is in contact with flange. If sweep is halted, cutter will dig into flange causing a scallop in the metal.

(8) Withdraw cutter axially by sweeping counterclockwise until cutter is clear of flange.

(9) Advance cutter radially 0.001 to 0.002 inch beyond previous setting.

(10) Repeat preceding steps (6) through (9) until ends of reworked area coincide with ends of area indicated on flange. Correction of minimum tip clearance by this method will automatically correct tip clearance at other points.

(11) Polish reworked areas lightly with emery cloth (320 grit) to remove burrs.

(12) Check thickness of flange wall at reworked areas. (Refer to preceding step d.)

(13) When rework is completed, remove finishing machine by reversing the installation cedure.

7-160. REPAIR OF FIRST STAGE TURBINE (T53-L-7/7A Engines). Repair axial cracks in liner (curl) or unacceptable wear depressions breakthrough caused by rubbing of combustion dimples as follows:

a. Using rotary file (air drill) and carbide rout out cracks indicated in fluorescent-penetr inspection. Where breakthrough or wear depr exist due to liner dimple rubbing, ensure that edges exist at depression on inner or outer of liner.

b. Vapor-degrease nozzle. (Refer to parag

c. Fusion-weld cracks or depressions in liner as outlined in paragraph 7-139, using we wire (item 122, table 2-2).

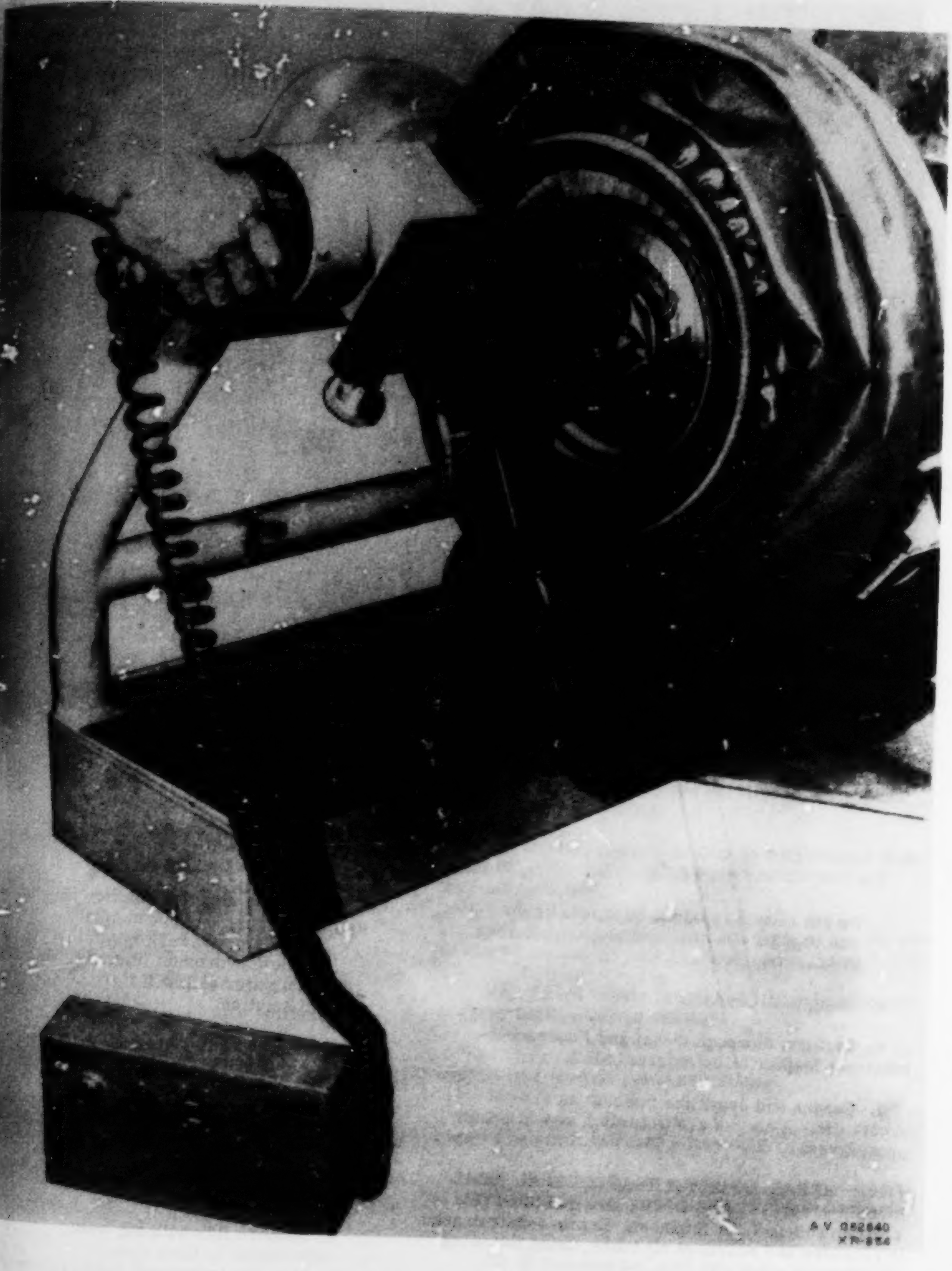

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Figure 7-97. Finishing Machine Installed Showing Masked Bearing and Balance Weight

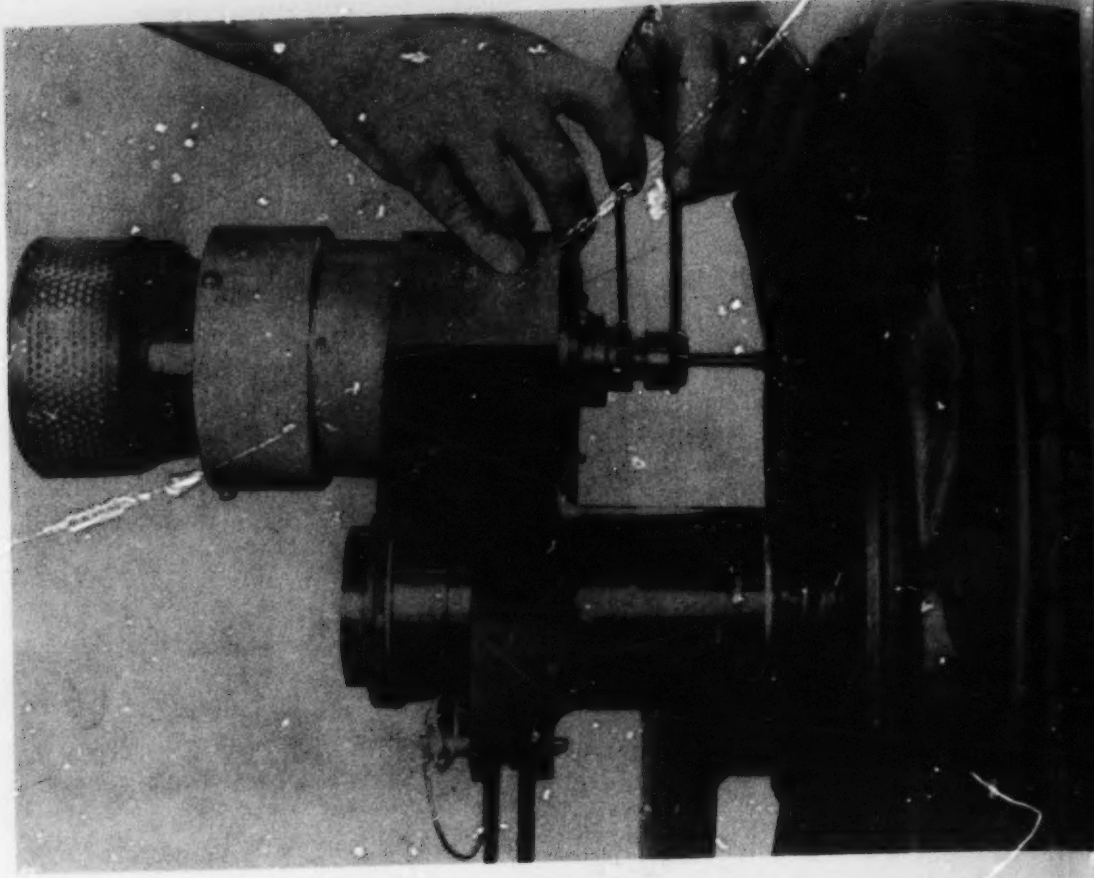


Figure 7-98. Tightening the Collet

NOTE

Do not reduce repaired thickness below that of adjacent sound metal when blending in following step d.

d. Blend weld beads.

e. Perform thorough visual and fluorescent-penetrant inspection on repaired area.

f. Cracks and cracklike indications are not acceptable. If cracks are indicated, repeat repair procedures.

7-161. REPAIR OF REAR BEARING SEAL, SEAL HOUSING, LINER, AND DIFFUSER HOUSING OIL TUBES (T53-L-7/7A Engines). Braze-repair cracks in pressure and scavenge oil tubes, using following procedure:

a. Vapor-degrease (paragraph 7-6); then soak in alkaline cleaner (item 4, table 2-2) to remove paint.

NOTE

Alkaline cleaning solution may be prepar
by miximg one pound alkaline clearer (item 4, table 2-2) with 6 to 8 ounces of sodium hydroxide (item 99, table 2-2). Add water at 160° F to make one gallon of solution.

b. Wire brush all cracked areas that are to
braze-repaired.

c. Apply flux (item 46, table 2-2) to areas
brazed.

d. Braze repair by torch brazing, using bra
alloy (item 10, table 2-2).

e. Remove flux with hot water.

f. Visually inspect all joints to ensure a c
covering of brazing alloy in all repaired areas

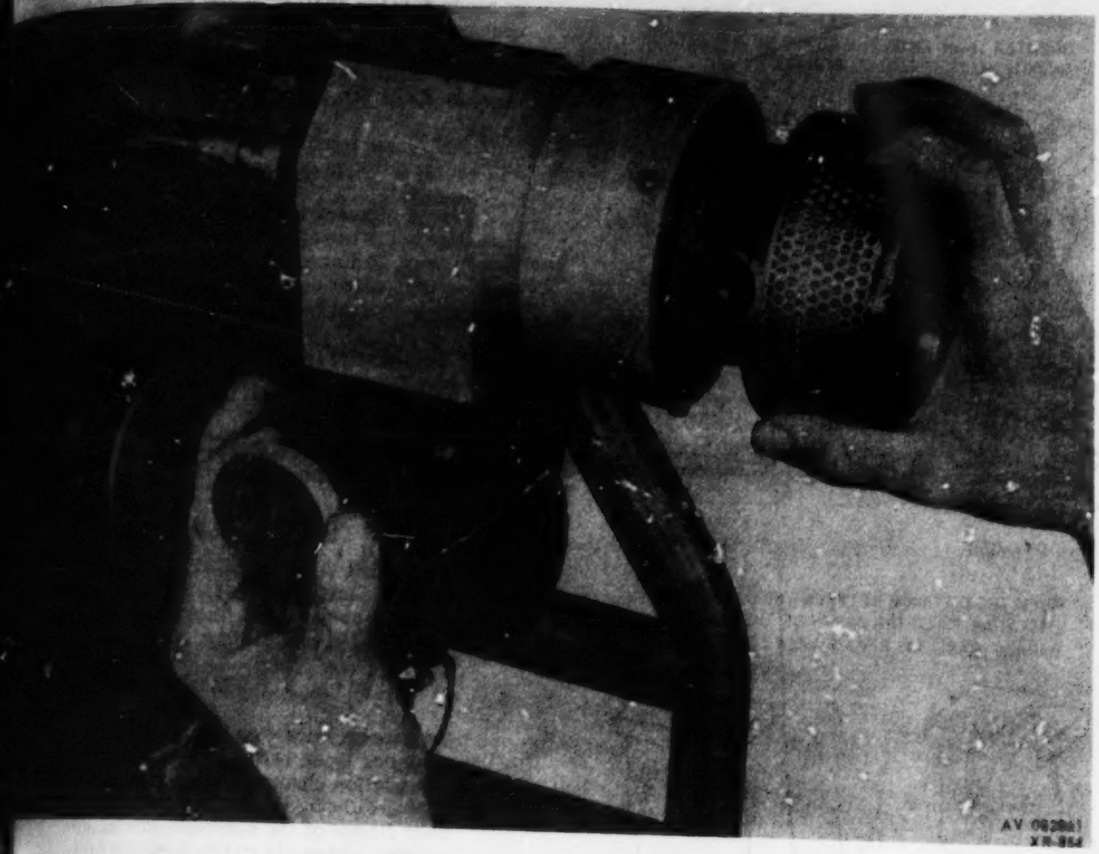


Figure 7-99. Adjusting Cutter Radially

Pressure-test oil tubes at 100 psi to ensure ere are no leaks.

REPAIR OF FIRE SHIELD (T53-L-15/701 es). If cracks in fire shield are within limits, r as follows:

Weld-repair cracks, using welding wire (item ble 2-2), as outlined in paragraph 7-139.

Blend-repair welds as outlined in paragraph

Visually and dye-penetrant reinspect weld areas cks. (Refer to paragraph 7-29.)

REPAIR OF FIRST STAGE POWER TURBINE ASSEMBLY (T53-L-15/701 Engines). Proceed ows:

Observe following rules during first stage power rotor blade repair.

) Use portable power drill or rotary file d with carbide burr. If these are not available, e-sinker -type file, India or carborundum stone substituted.

(2) Finish strokes are parallel to leading and trailing edges of blades.

(3) Final polishing of area is with crocus cloth (item 23, table 2-2). All repairs are blended and finished smoothly.

(4) Leading or trailing edge repairs are blended to smooth radius as part of repair. (See figure 7-100.)

(5) Finish repair length is blended to minimum of three times depth of damage.

b. Repair leading and/or trailing edges of first stage power turbine rotor as follows:

(1) Round bottom dents, 0.010 inch deep or less, require removal of sharp edges only.

(2) If distance between damage and shroud end of blade is less than twice depth of damage, extend repair to include shroud end.

(3) If distance between two damaged areas is less than twice depth of deeper damage, make one repair area. If distance between two damaged areas is greater than twice depth of deeper damage, make separate repair areas. (See figure 7-100.)

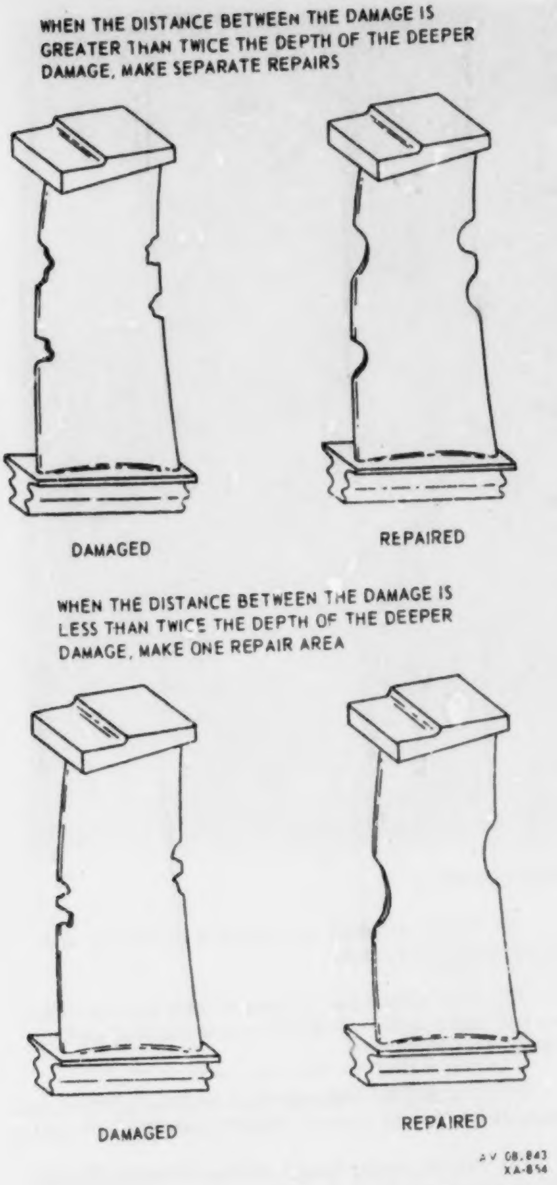

WHEN THE DISTANCE BETWEEN THE DAMAGE IS GREATER THAN TWICE THE DEPTH OF THE DEEPER DAMAGE, MAKE SEPARATE REPAIRS
DAMAGED
REPAIRED
WHEN THE DISTANCE BETWEEN THE DAMAGE IS LESS THAN TWICE THE DEPTH OF THE DEEPER DAMAGE, MAKE ONE REPAIR AREA
DAMAGED
REPAIRED
AV 08,843
XA-854

Figure 7-100. Power Turbine Blade Damage - Before and After Repair (T53-L-15/701)

(4) Damage that cannot be completely eliminated by allowable blade repairs are cause for rotor replacement.

c. Repair blade surfaces as follows:

(1) Maximum permissible decrease in thickness at any point on blade shall be 0.010 inch.

(2) Maximum permissible finished single repair on blade surface shall be 0.200 square inch on either concave or convex side.

(3) Repairs shall be blended to a minimum of twice depth of damage.

(4) Total repaired surface area shall not excee 10 percent of blade surface.

(5) If distance between two damaged areas is less than twice depth of deeper damage, make one repair area. If distance between two damaged areas i greater than twice depth of deeper damage, make separate repair areas. (See figure 7-100.)

(6) Damage that cannot be completely eliminated by allowable blade repairs is cause for rotor replacement.

(7) Return turbine rotor to Depot for reseatin or replacement of blades.

d. (Deleted)

7-164. REPAIR OF COMBUSTION CHAMBER HOUSING ASSEMBLY (T53-L-15/701 Engines). **Replace missing or damaged liner supports as follow (See figures 7-101 and 7-101A.)**

NOTE

To properly position the combustion chamber liner 1-130-780-01 in the combustion chamber housing assembly 1-130-610-05, the dimension from the rear flange of the combustion chamber housing assembly to the forward faces of the installed support liner assemblies 1-130-710-01 must be maintained at 1.095 to 1.105 inches (dimension A, figure 7-101A). Improperly installed support liner assemblies 1-130-710-01 can result in preloading and eventual cracking of the combustion chamber liner and also chafing of the fuel manifold nozzles.

a. Fabricate a support liner assembly holding fixture as shown in Appendix C, figure C-4.

b. Replace missing or damaged support liner a semblies as follows:

CAUTION

In following step (1), use care to grind only that portion of the rivet that protrude through the support liner assembly and not the housing parent metal.

(1) Grind existing rivets (see figure 7-101 remove formed heads. Using a 1/8 inch diamete punch, drive rivets from holes and remove dam supports.

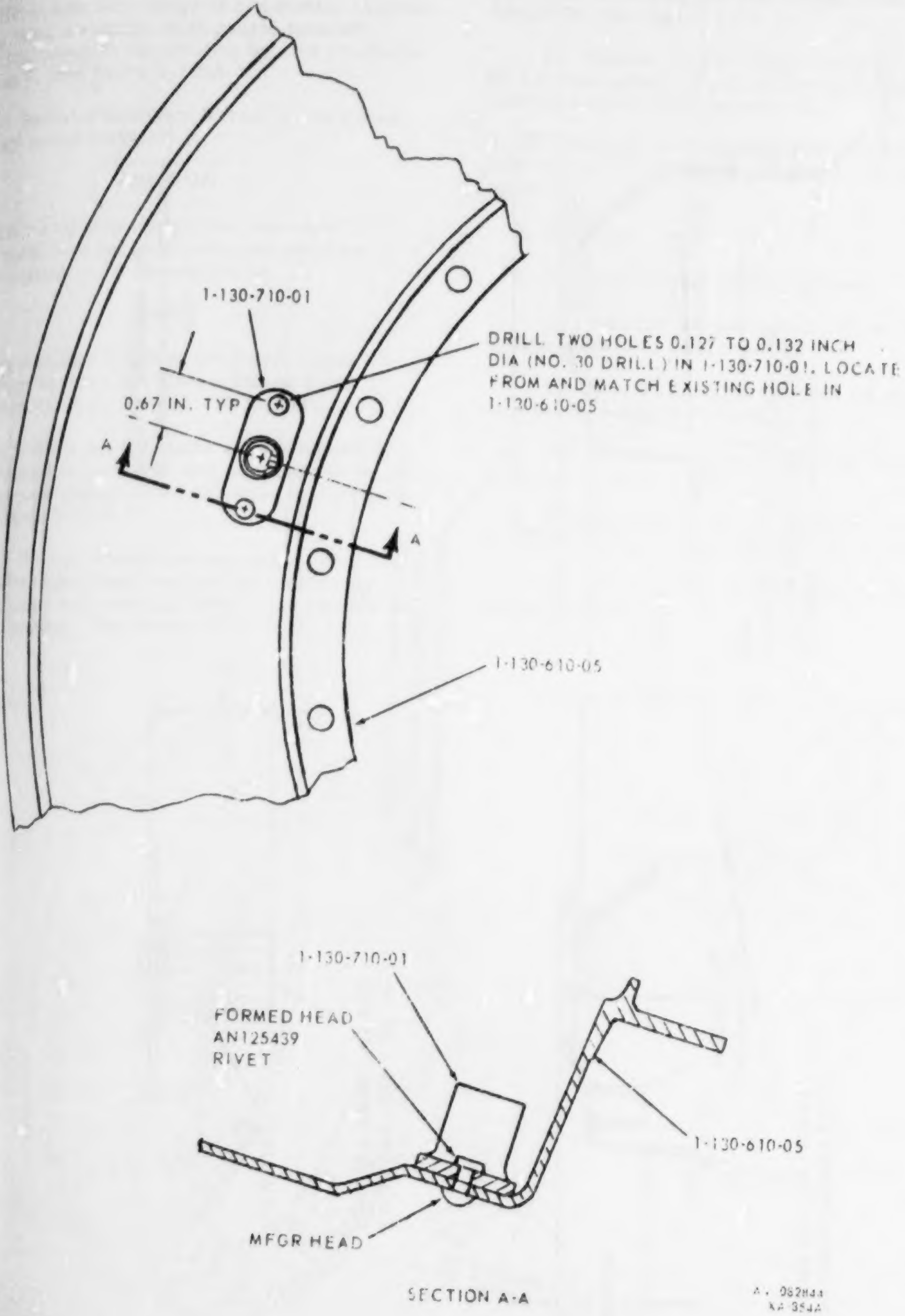
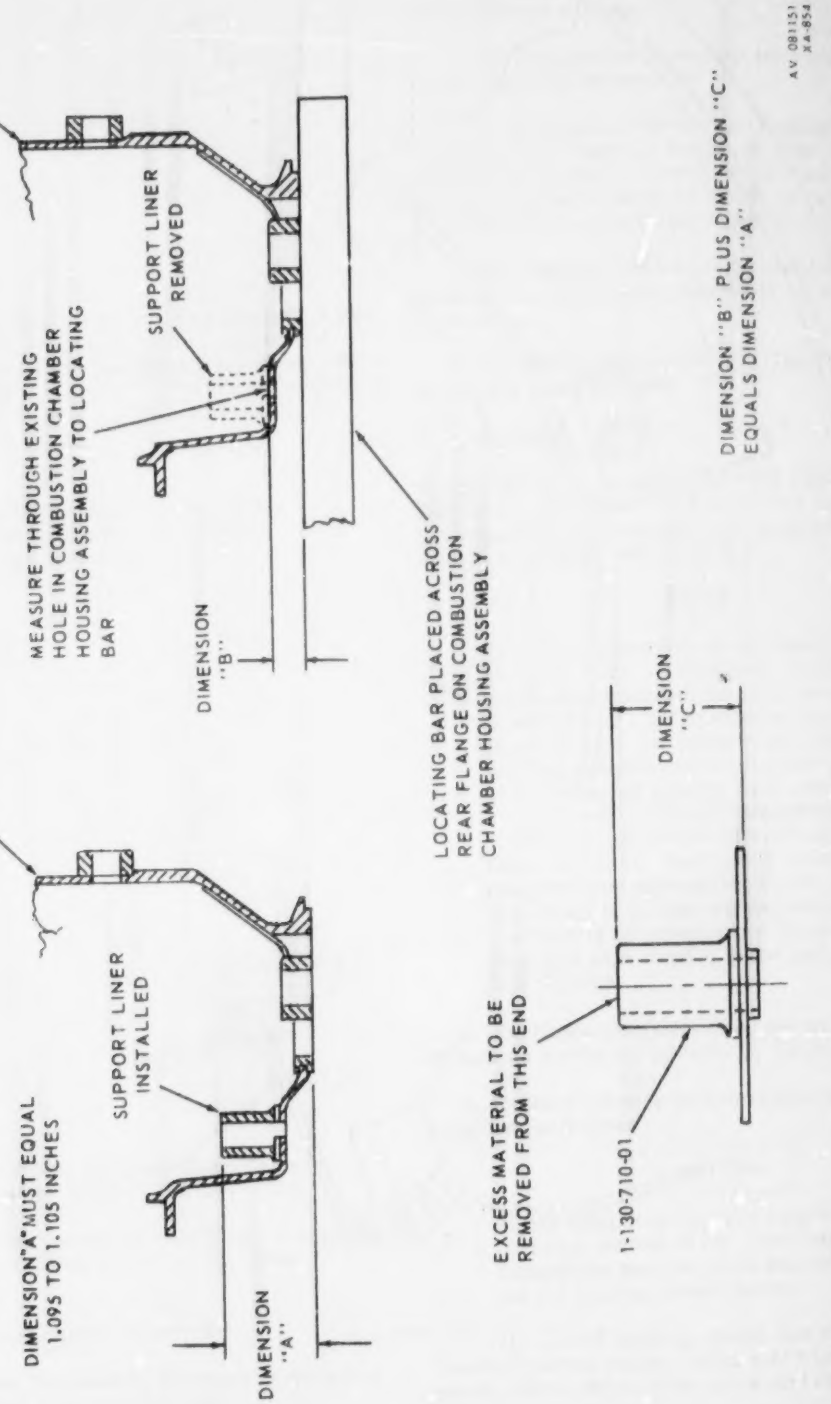

1-130-710-01
DRILL TWO HOLES 0.127 TO 0.132 INCH DIA (NO. 30 DRILL) IN 1-130-710-01. LOCATE FROM AND MATCH EXISTING HOLE IN 1-130-610-05
0.67 IN. TYP
A
A
1-130-610-05
1-130-710-01
FORMED HEAD AN125439 RIVET
1-130-610-05
MFGR HEAD
SECTION A-A
AV 062844
KA 354A

Figure 7-101. Replacing Support Liner Assembly (T53-L-15/701)


DIMENSION "A" MUST EQUAL 1.095 TO 1.105 INCHES
DIMENSION "A"
SUPPORT LINER INSTALLED
1-130-610-05
MEASURE THROUGH EXISTING HOLE IN COMBUSTION CHAMBER HOUSING ASSEMBLY TO LOCATING BAR
DIMENSION "B"
SUPPORT LINER REMOVED
1-130-610-05
LOCATING BAR PLACED ACROSS REAR FLANGE ON COMBUSTION CHAMBER HOUSING ASSEMBLY
EXCESS MATERIAL TO BE REMOVED FROM THIS END
1-130-710-01
DIMENSION "C"
DIMENSION "B" PLUS DIMENSION "C" EQUALS DIMENSION "A"
AV 081151
XA-854

(2) Remove all grinding residue and foreign ter from affected surfaces. Place a locating bar CT153) across rear flange of combustion chamber ing. Using a vernier depth gauge, measure ugh the housing to the locating bar and record as ension B. (See figure 7-101A.)

(3) Subtract dimension B from 1.100 inches. lt will be dimension C.

CAUTION

In following step (4), ensure reworked support liner assembly shoulder remains 90 degrees to the perpendicular.

NOTE

The combined length of the support liner assembly plus dimension B should equal dimension A (1.095 to 1.105 inches).

(4) Using a suitable lathe and the holding fix- fabricated in preceding step a., machine length placement support liner assembly to dimension (See figure 7-101A.)

(5) If not previously accomplished, drill two s in the replacement support liner assembly, ching holes with existing holes in the combustion ber housing. Use number 30 drill.

(6) Align holes in the support liner assembly with holes in housing and secure with rivets, AN125439. (See figure 7-101.)

(7) Repeat, as necessary, steps (1) through (6) for replacement of any additional damaged or missing support liner assemblies.

7-165. REPAIR OF COMBUSTION CHAMBER LINER ASSEMBLY (T53-L-15/701 Engines). Proceed as follows:

a. (Deleted)

b. Replace damaged studs as follows:

(1) Remove retainer clip (1, figure 7-102) that secures stud (2 or 3) to bracket.

(2) Remove damaged stud and replace with new stud having a like part number.

(3) Install new retainer clip and bend tabs to lock stud in place.

c. Replacement of worn or damaged seal guides (1-130-790-01 or 1-130-790-02). (See figure 7-103.)

(1) Using scribe, outline position of seal guide being replaced.

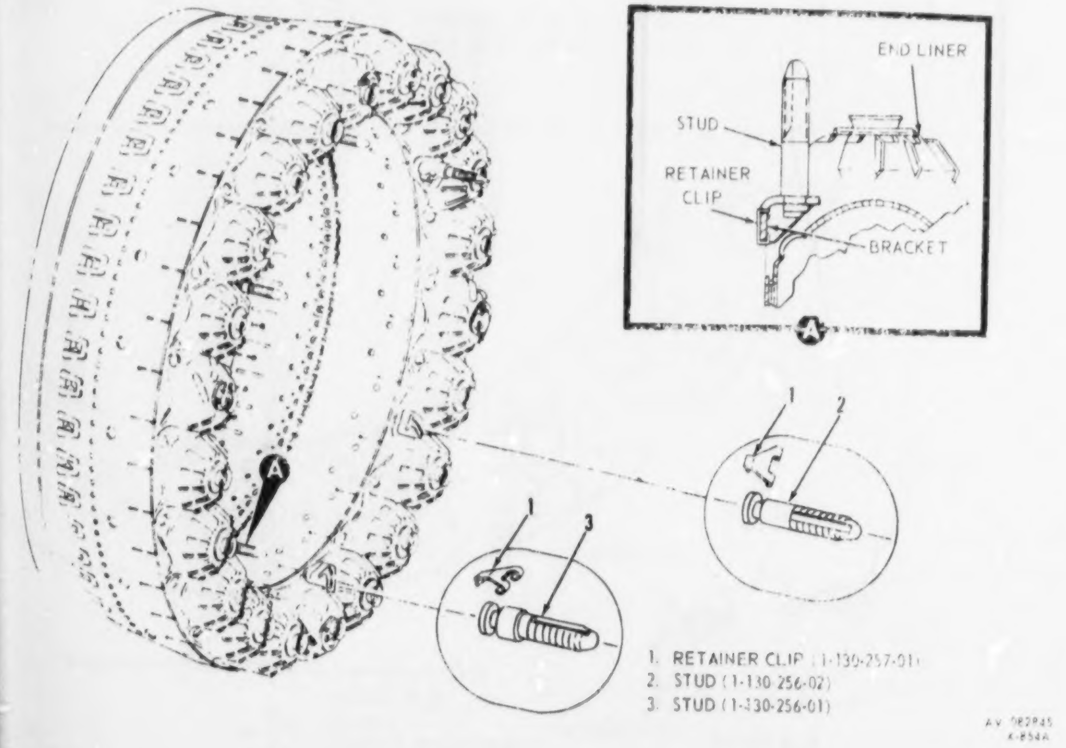


Figure 7-102. Replacement of Liner Studs (T53-L-15/701)

CAUTION

In following step (2), use care not to grind parent metal of liner.

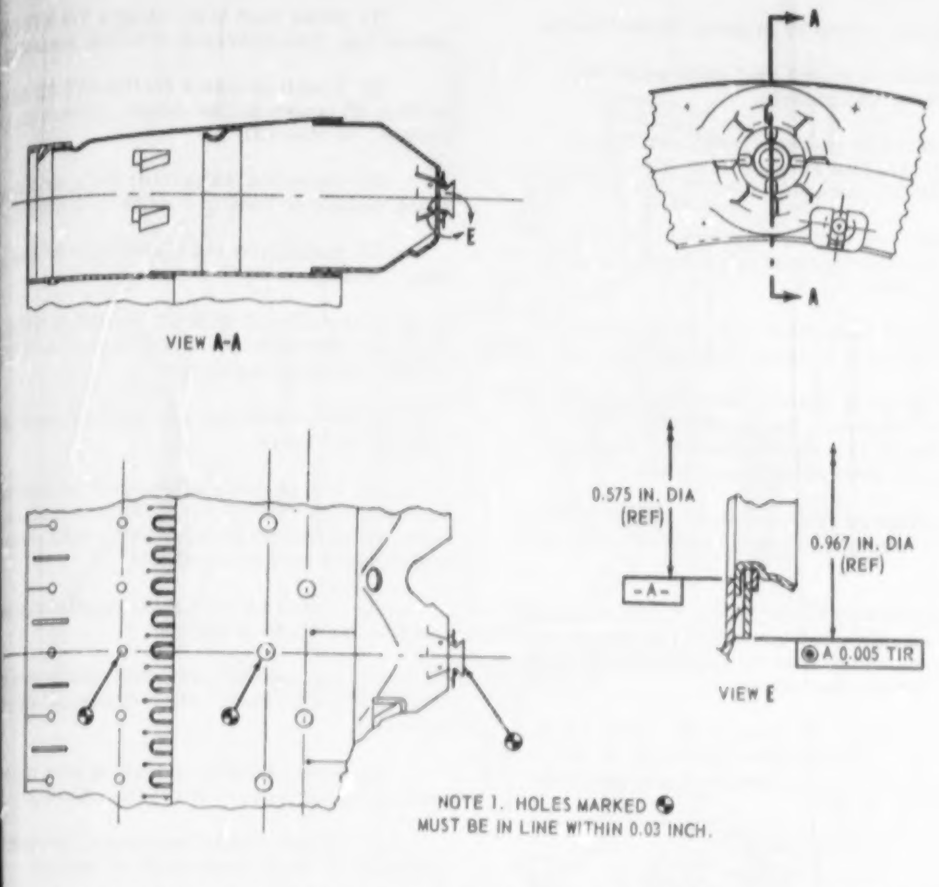
(2) Using carbide burr, grind tack weld and remove worn or damaged guide.

(3) Position new seal guide assembly (figure 7-103) and tack weld in four places using welding wire (item 123, table 2-2). (See figure 7-104.)

d. Replacement of worn or damaged seal guide 1-130-800-01. (See figure 7-104.)

NOTE

Loose rivets and/or elongated rivet holes are acceptable and not cause for guide or rivet replacement.


A
A
E
VIEW A-A
0.575 IN. DIA
(REF)
-A-
0.967 IN. DIA
(REF)
A 0.005 TIR
VIEW E
AV 082746
X-854

NOTE 1. HOLES MARKED ⊕ MUST BE IN LINE WITHIN 0.03 INCH.

Figure 7-103. Seal Guide Assembly (1-130-790-01 or 1-130-790-02) (T53-L-15/701)

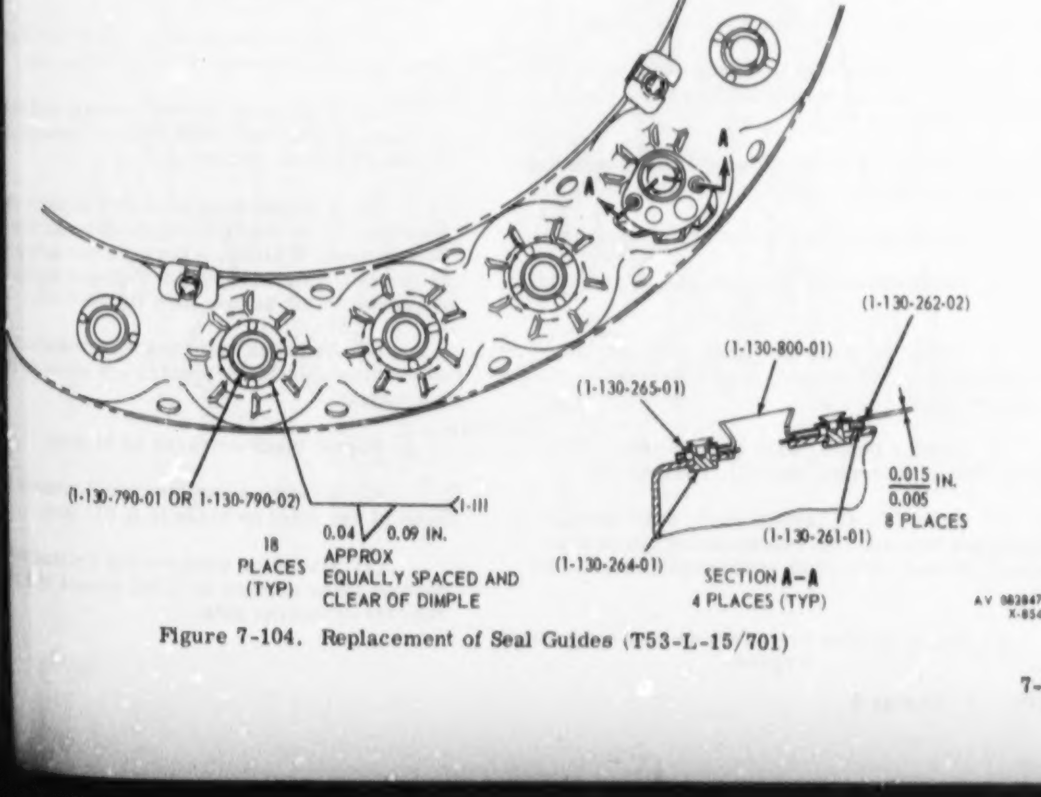

A
A
(1-130-262-02)
(1-130-800-01)
(1-130-265-01)
0.015
0.005
IN.
8 PLACES
(1-130-790-01 OR 1-130-790-02)
1-111
18
PLACES
(TYP)
0.04
0.09 IN.
APPROX
EQUALLY SPACED AND
CLEAR OF DIMPLE
(1-130-261-01)
(1-130-264-01)
SECTION A-A
4 PLACES (TYP)
AV 082847
X-854

Figure 7-104. Replacement of Seal Guides (T53-L-15/701)

(1) Remove rivets by grinding formed heads.

(2) Remove damaged seal guide assembly, rivets, washers, and gaskets.

(3) Install new gaskets (1-130-261-01 and 1-130-261-02), seal assembly (1-130-800-01), washers (1-130-265-01), and rivets (1-130-264-01).

(4) Head over rivets. Maintain 0.005 to 0.015 inch gap by temporarily inserting shim stock while forming rivet heads.

(5) Remove shim stock and check seal guide assembly for freedom of movement. (See figure 7-104.)

7-166. REPAIR OF EXHAUST DIFFUSER ASSEMBLY (T53-L-15/701 Engines). Repair dents that create a gap greater than 1/32 inch between outer strut and strut fairing as follows: (See figure 7-105.)

a. Using rubber or leather-headed mallet, deform flange or strut fairing as close to outer strut as possible.

b. Tack-weld threaded end of a 1/4-inch diameter by one inch long, low alloy steel hex head bolt to center of dent. Tack welds shall be approximately 0.045 inch long and 180 degrees apart.

c. Apply an outward pressure under head of bolt until dented area conforms (after pressure is released) to contour of undamaged strut and strut fairing areas adjacent to dent.

CAUTION

During grinding in following step d., do not reduce strut wall thickness.

d. Remove bolt by grinding away tack welds.

e. Visually inspect repaired areas to ensure that strut and strut fairing mating surfaces are closed within allowable limits.

f. Replace damaged thermocouple mounting studs on exhaust diffuser as follows: (See figure 7-105A.)

(1) Cut off stud flush to surface of boss.

(2) Using center drill, start hole in remainder of stud.

(3) Using No. 8 carbide drill, drill into stud approximately 0.150 inch below face of boss (cutting through lockpin).

(4) Using a punch, drive part of lockpin into hole drilled in preceding step (3). Remove pin.

(5) Using No. 43 carbide drill, drill through existing pin hole and into remainder of pin in opposite wall of stud, to a depth of approximately 0.380 inch.

(6) Using suitable tool, remove stud from boss.

(7) Retap stud hole, using a 1/4 x 28 UNF-
bottom tap. Clean threads with compressed air.

(8) Install new stud (1-150-007-02) and tig
to 70 to 95 pound-inches torque. Ensure that stud
bottoms on cone OD.

(9) Using No. 43 carbide drill, drill throug
isting pinhole in boss to a depth of 0.460 inch.

(10) Install new pin (1-140-023-06) flush wi
boss. Stake pin.

7-167. REPAIR OF POWER TURBINE ROTOR A
BEARING HOUSING ASSEMBLY (T53-L-15/701
gines). Proceed as follows:

a. Observe following rules during power turb
rotor blade repair.

(1) Use portable power drill or rotary file
equipped with carbide burr. If these are not avail
able, small diesinker type file or India or carbo
undum stone may be substituted.

(2) Finish strokes shall be parallel to lea
and trailing edges of blades.

(3) Final polish area with crocus cloth (
table 2-2). All repairs shall be blended and fini
smoothly.

(4) Blend leading or trailing edge repairs
smooth radius as part of repair. (See figure 7-1

(5) Finish repair length shall be blended t
minimum of three times depth of damage.

b. Repair leading and/or trailing edges of po
turbine rotor as follows:

(1) Round bottom dents, 0.010 inch deep o
less, require removal of sharp edges only.

(2) If distance between damage and shrou
of blade is less than twice depth of damage, ext
repair to include shroud end.

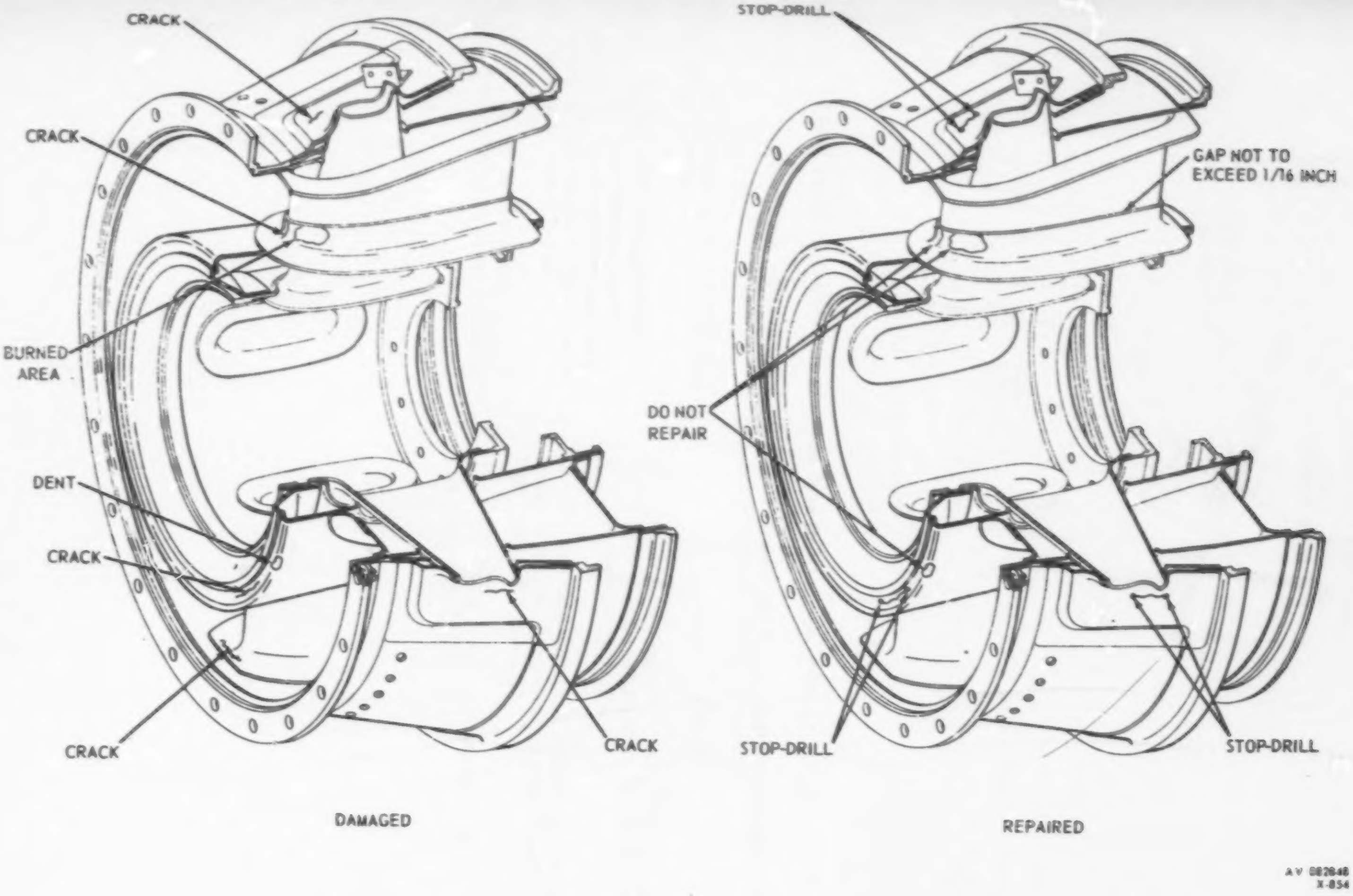
(3) If distance between two damaged area
less than twice depth of deeper damage, make o
repair area. If distance between two damaged a
is greater than twice depth of deeper damage,
separate repair areas. (See figure 7-100.)

(4) Damages that cannot be completely e
ed by allowable blade repairs are cause for ro
placement.

c. Repair blade surfaces as follows:

(1) Maximum permissible decrease in th
ness at any point on blade is 0.010 inch.

(2) Maximum permissible finished singl
pair on blade surface is 0.200 square inch on e
concave or convex side.



CRACK
CRACK
BURNED AREA
DENT
CRACK
CRACK
CRACK
STOP-DRILL
GAP NOT TO EXCEED 1/16 INCH
DO NOT REPAIR
STOP-DRILL
STOP-DRILL
AV 082848
X-854

DAMAGED

REPAIRED

Figure 7-105. Exhaust Diffuser - Before and After Repair (T53-L-15/701)

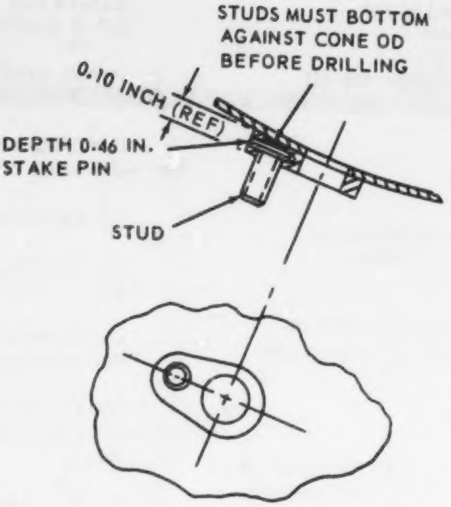

STUDS MUST BOTTOM
AGAINST CONE OD
BEFORE DRILLING
0.10 INCH (REF)
DEPTH 0.46 IN.
STAKE PIN
STUD
AV 081078
XA-854

Figure 7-105A. Exhaust Thermocouple Mounting Stud Replacement (T53-L-15/701)

lend repairs to minimum of twice depth

otal repaired surface area shall not ex-
cent of blade surface.

distance between two damaged areas is
ice depth of deeper damage, make one
. If distance between two damaged areas
an twice depth of deeper damage, make
air areas. (See figure 7-100.)

amage that cannot be completely elim-
owable blade repairs is cause for rotor

d. Reseat blades recessed more than 0.025 inch below aft face of disc as follows:

NOTE

Number one blade is first blade counterclockwise from balancing "O" marking on forward face of disc.

(1) Locate and mark number one blade on both sides using marking pencil (yellow) Colorbrite No. 2107 (item 72, table 2-2).

(2) Place rotor, forward face up, in fixture assembly (LTCT2072).

NOTE

Ensure that blade being tapped is not positioned over slot in fixture.

(3) Starting with number one blade, tap all blades flush with aft face of disc using hammer and drift (LTCT552).

CAUTION

Ensure that staking tool used in following step (4) does not contact disc or blades during driving operation.

(4) Using staking tool assembly (LTCT3738) on mushroomed pins, or hammer and drive punch on recessed pins,redrive all pins.

(5) Remove staking tool (if used).

7-168. REPAIR OF SECOND STAGE GAS PRODUCER TURBINE ROTOR ASSEMBLY (T53-L-15/701 Engines). Reseat blades recessed more than 0.025 inch below aft face of disc as follows:

NOTE

Number one blade is first blade counterclockwise from balancing "O" marking on forward face of disc.

a. Locate and mark number one blade on both sides using marking pencil (yellow) Colorbrite No. 2107 (item 72, table 2-2).

NOTE

In following step b., ensure that blade being tapped is not positioned over slot in fixture assembly.

b. Place rotor, forward face up, in fixture assembly (LTCT2072).

c. Starting with number one blade, tap all blades flush with aft face of disc using hammer and drift (LTCT552).

CAUTION

Ensure that staking tool used in following step d. does not contact disc or blades during driving operation.

d. Using staking tool assembly (LTCT3738) on mushroomed pins, or a hammer and a drive punch on recessed pins, redrive all pins.

e. Remove staking tool (if used).

7-169. REPAIR OF FIRST STAGE GAS PRODUCER NOZZLE ASSEMBLY (T53-L-15/701 Engines). Proceed as follows:

NOTE

Ensure that no sharp edges exist on ID or OD of liner (curl).

a. Repair axial cracks or unacceptable wear depressions on nozzle liner (curl) OD as follows:

(1) Using rotary file (air drill) and carbide rout out cracks or wear depressions.

(2) Vapor-degrease nozzle. (Refer to parag 7-6.)

NOTE

Do not reduce repaired thickness below that of adjacent sound metal.

(3) Fusion-weld cracks or wear depressio outlined in paragraph 7-139, using alloy wire (ite 124, table 2-2).

(4) Blend weld beads.

(5) Perform fluorescent-penetrant or dye-penetrant inspection on repaired area(s). Crack cracklike indications are not acceptable. If crac are evident, repeat repair procedure.

NOTE

The first stage gas producer nozzle assemb is a high value item and should be carefull packaged for shipment in a suitable reusable container. Wrap nozzle in transparent bag (item 119, table 2-2) in accordance with Military Specification MIL-B-22020, Type I. Install in cushioni material of container, close container, secure, and properly tag for shipment.

b. Replace first stage gas producer nozzle inspection limits are exceeded.

c. Perform adjustment of fuel control after replacement of first stage gas producer nozzle sembly. (Refer to paragraph 5-86.)

7-170. SKIMMING PROCEDURE FOR FIRST GAS PRODUCER NOZZLE ASSEMBLY AND S STAGE GAS PRODUCER CYLINDER (T53-L-701 Engines). Proceed as follows:

a. Install combustion chamber deflector, stage gas producer nozzle assembly, and relat (Refer to paragraph 9-21, steps a. through i.)

b. The first stage turbine nozzle flange-kit (LTCT2020) must be converted to T53-L-application as follows: (See figures 7-88, 7-1 7-107.)

(1) Remove nut (LTCT2266), washer (LT and adapter (LTCT4127) from finishing mach (LTCT2125, detail of LTCT2020).

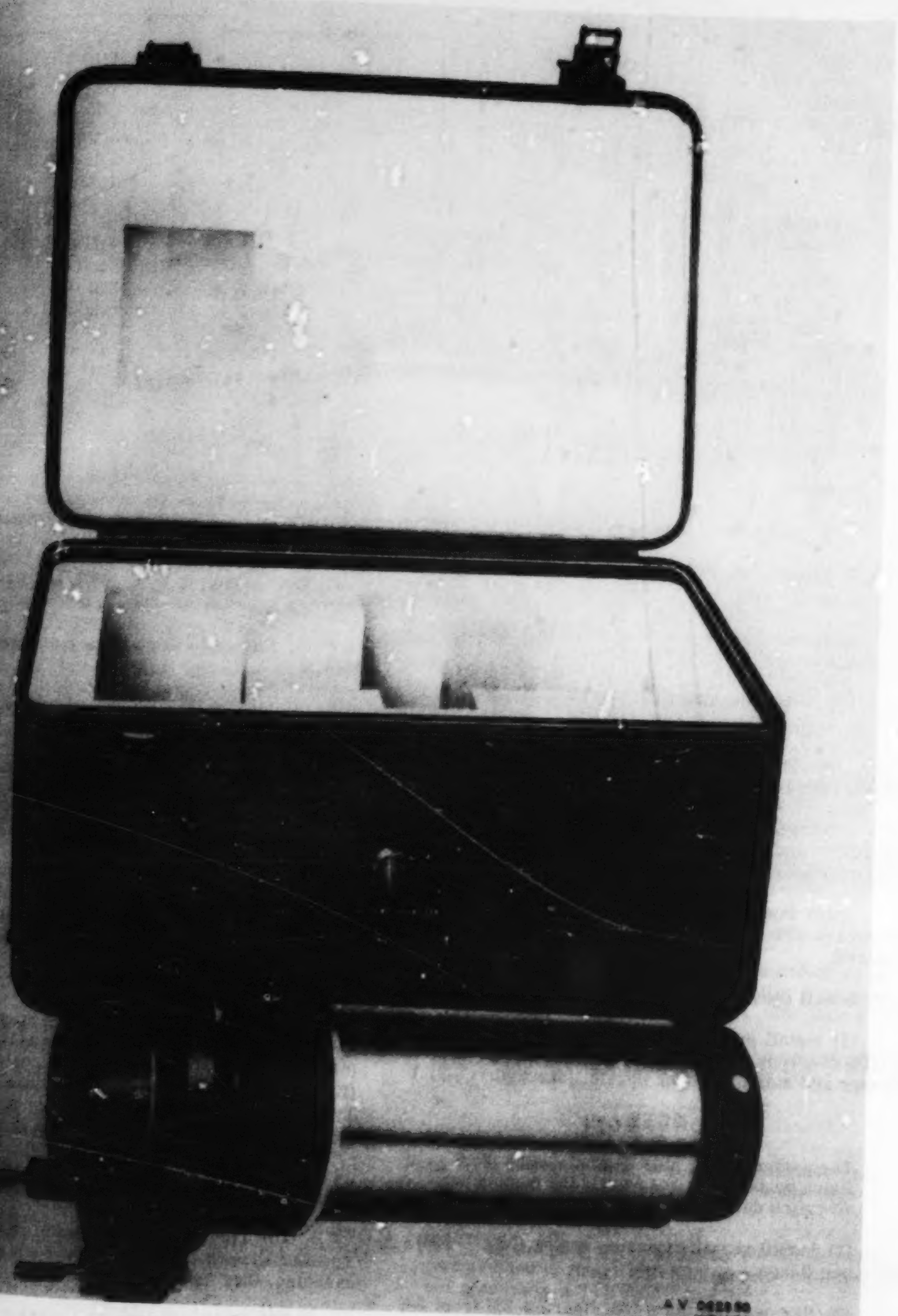


Figure 7-106. Finishing Adapter Kit (LTCT4172) (T53-L-15/701)

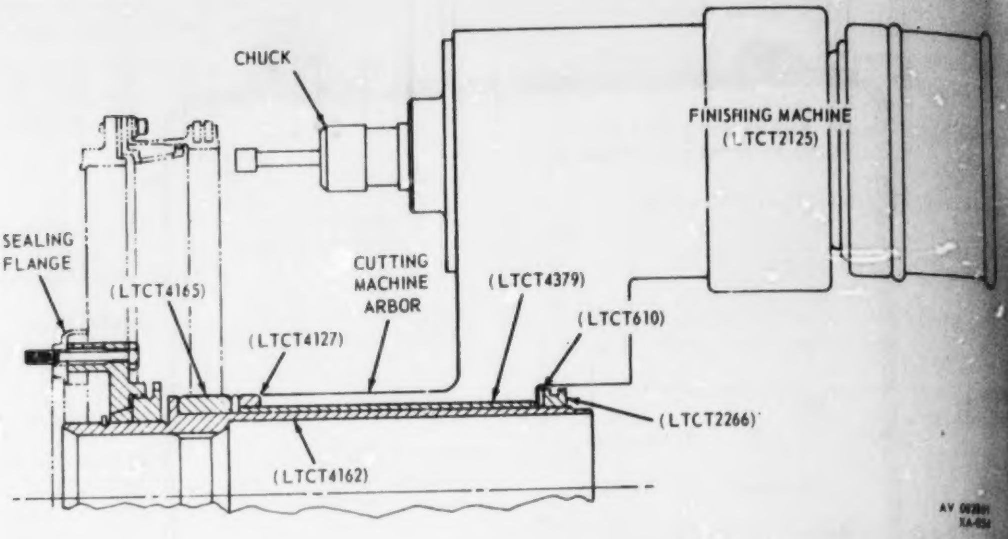


Figure 7-107. Second Stage Gas Producer Cylinder Skimming Kit Conversion (T53-L-15/701)

(2) Remove adapter (LTCT613) from cutting machine arbor.

(3) Install first and second stage turbine flange finishing adapter (LTCT4172) as follows:

(a) Slide bushing (LTCT4379) into finishing machine arbor.

(b) Position adapter (LTCT4162, detail of LTCT4172) into finishing machine arbor.

(c) Position adapter (LTCT4127, detail of LTCT2125) and spacer (LTCT4165, detail of LTCT 4172) over adapter (LTCT4162).

(d) Position washer (LTCT610) on adapter and secure with nut (LTCT2266). Tighten nut as required.

c. Install converted flange finishing kit as follows:

(1) Install protective cover (LTCT4408, detail of LTCT2020) by placing large end over flange of air diffuser and small end over nozzle. (See figure 7-91.)

NOTE

The garter spring aids in producing a good finish by reducing resonance and dampening vibration during milling operation.

(2) Install garter extension spring (LTCT9396) on nozzle flange.

(3) Remove four bolts (36, figure 3-28) from 3-, 6-, 9-, and 12-o'clock positions on flange of sealing ring (28). (See figure 7-108.)

(4) Slide finishing machine onto rear co shaft. (This requires two men.) Insert captive sc into open screw holes and tighten finger-tight.

(5) Ensure bushing and adapter are free o shaft.

(6) Push machine forward until shaft cont compressor turbine forward cone.

(7) Install compressor turbine rear cone (1- 411-03) furnished with kit, using sleeve bushing (LTCT4406) and shaft adapter (LTCT4496). (See figure 7-93.)

NOTE

If difficulties are encountered during installation of cone and retaining nut, raise rear end of arbor slightly to make it concentric with stub shaft.

(8) Install bearing retaining spanner nut. (figure 7-94.) Tighten nut to 700 to 800 pound-inch (56 to 66 pound-feet) torque with face spanner wr (LTCT4450). Use spanner wrench (GGG-W-665B, Type II) to prevent rotor shaft from turning duri tightening operation. (See figure 7-95.)

(9) Tighten captive screws in finishing ma adapter to 75 to 80 pound-inches torque.

(10) Tighten bushing (no torque value) with spanner wrench (LTCT4402-02) furnished with machine. (See figure 7-96.)

(11) Mask openings and bearing area with (See figure 7-97.)

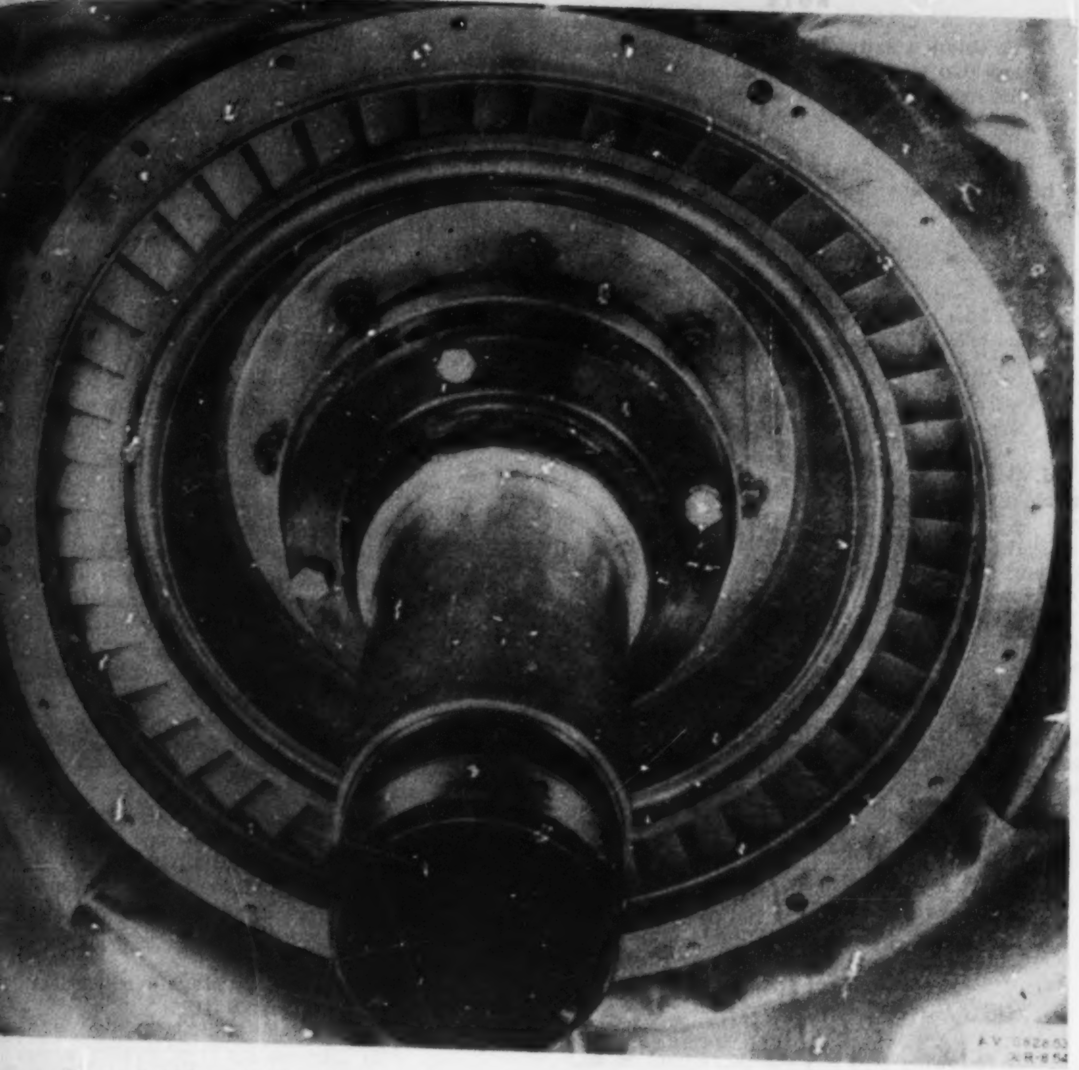


Figure 7-108. Bolt Positions for Mounting Finishing Machine (T53-L-15/701)

Install finishing machine balance shaft and
TCT4389 and LTCT4388). Secure with

NOTE

grinder must be held firmly by aft
Turning entire machine clockwise
move grinder forward axially (toward
of engine). Turning counterclockwise
move grinder toward aft end of
e.

Hold grinder (figure 7-97) firmly by base
achine counterclockwise until feed reaches

Install cutter (LTCT9261) in collet of
he collet must be tight enough to prevent cutter from moving freely but loose enough to permit it to be moved by hand. Back of cutter head must not be more than one inch from collet. (See figure 7-98.)

(15) Hold grinder by base, and turn machine clockwise until feed reaches forward stop.

CAUTION

In following step (16) if cutter extends into radius of flange, it will thin the nozzle outer shroud excessively.

(16) Adjust cutter to reach aft end of radius at forward end of flange and tighten collet, using spanner wrenches (LTCT9263).

NOTE

To obtain a satisfactory finish do not use a tool that vibrates (does not run true) and do not extend a 1/4-inch shank tool more than one inch of shank beyond collet.

(17) Hold grinder as before and withdraw cutter by turning machine counterclockwise until grinder reaches aft stop.

(18) Check collet to ensure tightness.

WARNING

In following step d., safety glasses must be worn during operation of finishing machine to protect eyes from flying chips.

d. Operate first stage turbine flange finishing machine as follows:

(1) Advance grinder until at least one-half of cutter is within flange.

(2) Station cutter at area of minimum tip clearance (highest point) indicated by markings on edge of flange.

(3) Advance cutter radially by turning adjusting handle (see figure 7-99) until cutter just contacts inner surface of flange: then sweep cutter around flange to ensure adjustment to the highest point.

CAUTION

In following step (4), the first cut should always be shallow since the flange may be tapered. A deep first cut may damage the cutter and/or flange.

NOTE

In following step (4), one increment on dial of adjusting handle will advance cutter radially approximately 0.001 inch.

(4) Turn finishing machine counterclockwise until cutter is clear of flange: then advance radially 0.001 to 0.002 inch by turning adjusting handle clockwise.

NOTE

Electric power is 110 to 120 volts ac, 15 amperes, 50 to 60 cycles.

(5) Install electric power cable from grinder to control box and connect control box to power source. The round prong on plug is the ground. If socket has no ground connection, swing ground prong to one side and wire to plate screw in junction box.

(6) (Deleted)

WARNING

Safety goggles must be worn during milling operation.

CAUTION

Do not halt sweep between stops (forward and aft) while cutter is in contact with flange. If sweep is halted, cutter will dig into flange causing a scallop in the metal.

(7) Start grinder. Wait approximately 10
until it reaches maximum speed. Slowly sweep
clockwise around flange until forward stop is

(8) Withdraw cutter axially by sweeping
clockwise until cutter is clear of flange.

(9) Advance cutter radially 0.001 to 0.00
beyond previous setting.

(10) Repeat preceding steps (6) and (9)
of reworked area coincide with ends of area
on flange. Correction of minimum tip clearance
this method will automatically correct tip
at other points.

(11) Polish reworked areas lightly with
cloth (320 grit) to remove burrs.

(12) Check thickness of flange wall at
areas.

e. If second stage gas producer cylinder is to
reworked, proceed to following step f. If only
stage gas producer nozzle assembly was to be
worked, remove flange finishing machine by
installation procedures.

f. Rework second stage gas producer cylinder
follows: (See figure 7-109.)

(1) Remove nut (LTCT2266), washer
adapter (LTCT4127), and spacer (LTCT4165)
adapter (LTCT4162). (Refer to figure 7-107.)

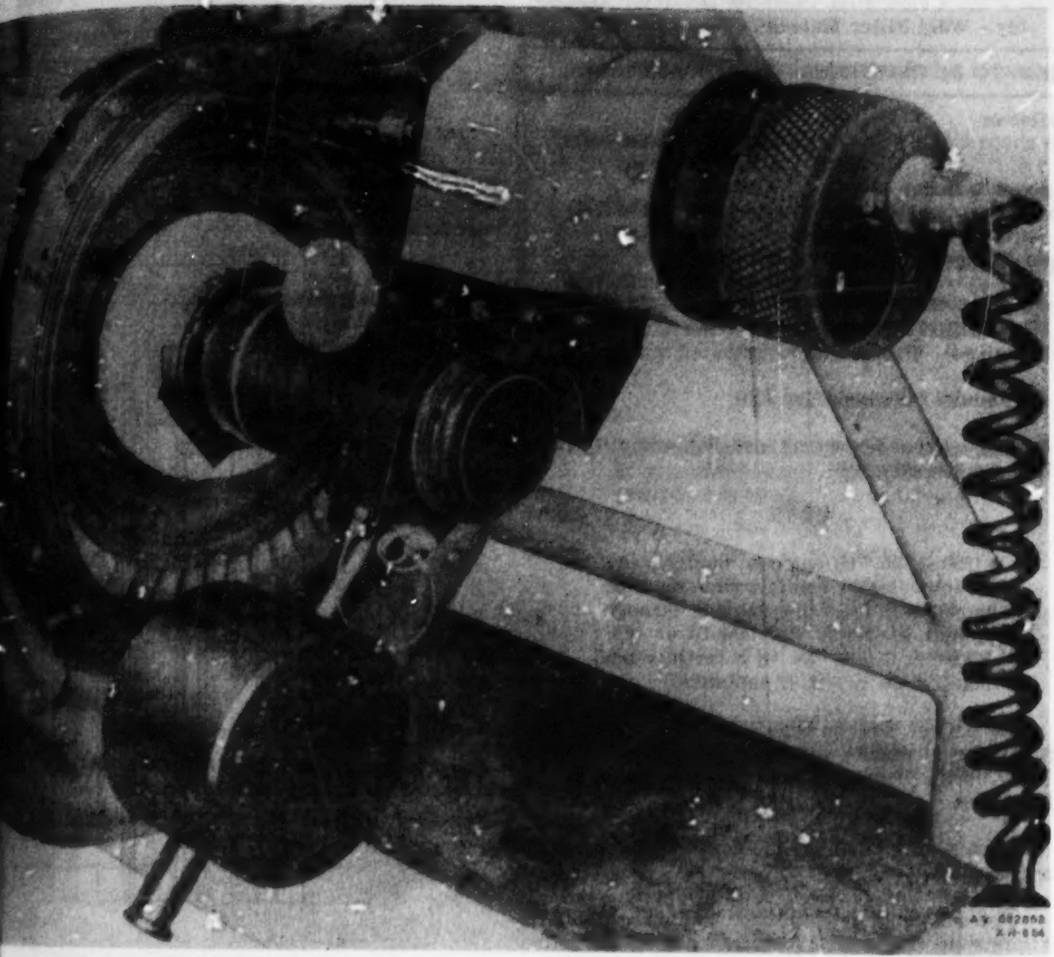
NOTE

Bushing (LTCT4379) will normally remain
on finishing machine adapter. Remove
bushing from adapter and install in cutting
machine arbor.

(2) Slide cutting machine away from adapter (LTCT4162).

(3) Install spacer (LTCT4165) on adapter (LTCT4162).

(4) Install second stage gas producer
on engine. Secure cylinder to first stage gas
nozzle assembly with pins (52, figure 3-28) and
(45).



gure 7-109. Installation of Machine for Grinding Second Stage Gas Producer Cylinder (T53-L-15/701)

(5) Position finishing machine, with bushing lled, on adapter (LTCT4162).

(6) Install adapter (LTCT4127) and washer T610) on adapter (LTCT4162). Secure this as- ly with nut (LTCT2266). Tighten nut as required.

(7) Repeat preceding step d.

(8) When rework is completed, remove flange ing machine by reversing the installation dure.

. REPAIR OF COMBUSTION CHAMBER ECTOR (T53-L-15/701 Engines). Repair or e combustion chamber deflector if crack limits reeded.

Repair cracks in or near deflector seam weld, ess of 180 degrees cumulative length, as follows:

NOTE

Close crack gap with clamps, vise, or blocks.

(1) Tack-weld each end of cracks exceeding 30 degrees.

(2) Wherever possible, additional tacks should be equally distributed to maintain alignment for welding.

(3) Fusion weld between tack welds.

b. Repair cracks in the support (bolt hole ring and surrounding parent metal) by fusion welding, using welding wire shown in table 7-10.

c. Inspect weld repairs by nondestructive inspection (dye-penetrant) method, Military Specification MIL-I-25135, Group II. (Refer to paragraph 7-29.)

Table 7-10. Combustion Chamber Deflector Assembly - Weld Filler Material (T53-L-15/701)

AREA TO BE REWORKED	FILLER MATERIAL
Deflector	Alloy Wire (item 124, table 2-2)
Support Cylinder	Alloy Wire (item 124, table 2-2)
Inner Flange	Welding Wire (item 122, table 2-2)

7-172. REPLACEMENT OF AFT SEAL (T53-L-15/701 Engines). Proceed as follows:

a. Remove retaining ring (25).

b. Using arbor press and installation tool (LTCT 3825), remove seal (26).

NOTE

On T53-L-15/701 engines, the following seal and retainer configuration must be adhered to in following steps c. through g. Install aft seal 1-300-174-02 or -03 in retainer 1-110-194-04 if forward seal 1-300-173-02 or -03 is installed.

c. Install new seal on base (LTCT3826, detail of LTCT3825) and secure with clamp (LTCT3875, detail of LTCT3825). Place seal with base and clamp in arbor press.

d. Heat retainer (27) to 300° to 380°F for 20 to 30 minutes.

e. Remove retainer from oven and place onto seal. Position anvil (LTCT3827, detail of LTCT3825) onto retainer and seat firmly with arbor press.

f. Reinstall retaining ring.

g. Inspect for proper installation. (See figure 7-109A.)

7-173. REPAIR OF COMPRESSOR AND IMPELLER HOUSING ASSEMBLIES (T53-L-7/7A Engines). Proceed as follows:

NOTE

If either half of an axial compressor housing is damaged beyond repair, both halves must be replaced. If damage on only half of a compressor vane assembly exceeds maximum permissible limits, only that affected assembly half shall be replaced.

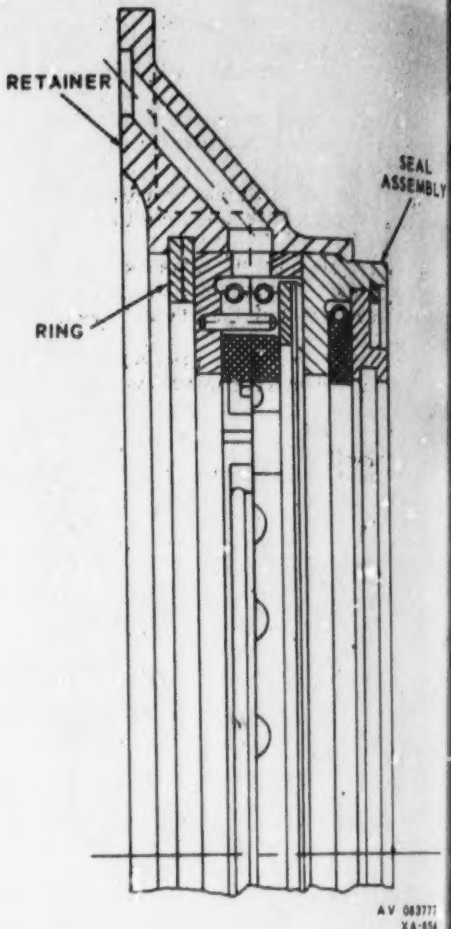


Figure 7-109A. Aft Seal - Installation

Stator vanes halves remaining after other halves have been rejected can be rematched with another serviceable half.

a. Repairs shall be made with small diesink type files and India or carborundum stones. Abr sive crocus cloth (item 23, table 2-2) shall be u for final polishing. Power tools shall not be use All repairs shall be blended and finished smooth Finish strokes of all repair work shall be paral to longitudinal axis of vane.

b. Dents with smooth contours are acceptabl with rework, provided they do not exceed maxim permissible limits.

c. Nicks, burrs, pits, and dents shall be blend-repaired as shown in figure 7-110, provided that damage after repair does not exceed 1/4 vane thickness and longest dimension shall be at least twice and not more than four times the depth.

d. Nicks and dents are permitted up to 0.080 inch in depth on leading and trailing edge after repair.

e. Nicks and dents on vanes in inaccessible areas of repair are acceptable without rework, provided they do not exceed maximum permissible limits.

f. Bent vanes shall be straightened, using padded pliers or equivalent. If straightening causes a crack in the vane, assembly half shall be replaced.

g. Remove nicks, burrs, and tight-lipped cracks from impeller and compressor housing by blend repair.

(1) (Deleted)

(2) Reinspect repaired areas. No cracks allowed.

h. Refinish painted surfaces. (Refer to paragraph 7-142.)

i. Replace parts that have crossed threads or irreparable distortion.

j. Repair areas where the magnesium surface or HAE undercoat can be seen in accordance with paragraph 7-143.

7-174. REPAIR OF COMPRESSOR AND IMPELLER HOUSING ASSEMBLIES (T53-L-15/701 Engines).

Proceed as follows:

NOTE

If either half of axial compressor housing is damaged beyond repair, both halves must be replaced.

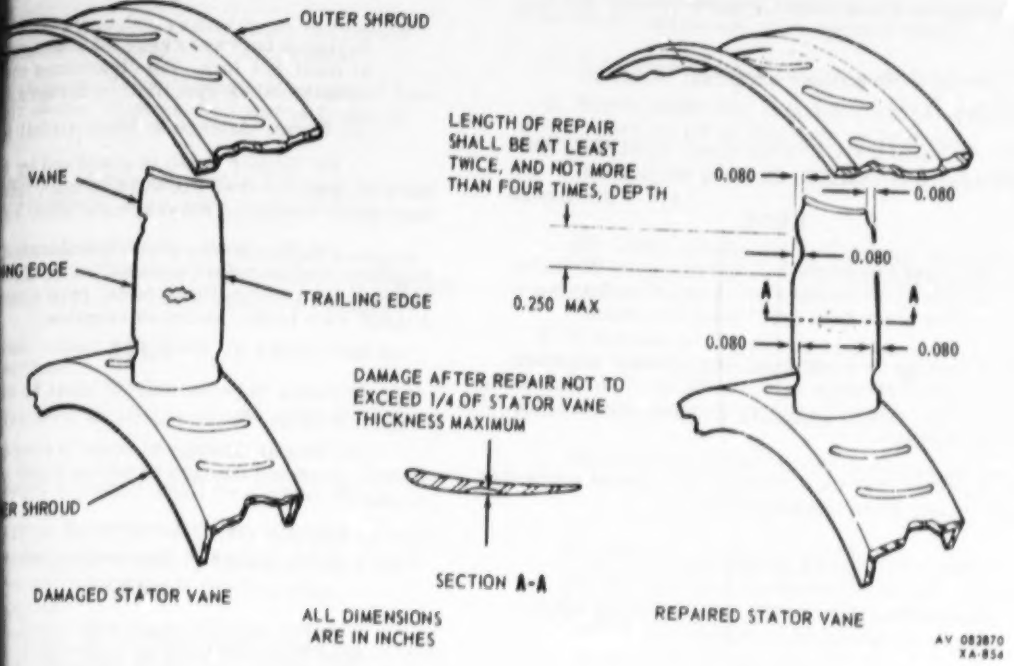

OUTER SHROUD
VANE
ING EDGE
TRAILING EDGE
R SHROUD
DAMAGED STATOR VANE
LENGTH OF REPAIR SHALL BE AT LEAST TWICE, AND NOT MORE THAN FOUR TIMES, DEPTH
0.250 MAX
DAMAGE AFTER REPAIR NOT TO EXCEED 1/4 OF STATOR VANE THICKNESS MAXIMUM
SECTION A-A
ALL DIMENSIONS ARE IN INCHES
0.080
0.080
0.080
0.080
0.080
A
A
REPAIRED STATOR VANE
AV 083870
XA-854

Figure 7-110. Compressor Stator Vane Repair Limits

NOTE

ge on only one half of a compressor sembly exceeds the maximum per- e limits, only that affected assembly ll be replaced. Stator vane halves ng after other halves have been l can be rematched with another ble half. Rematched stator vane lies shall meet all assembly require- nd shall have approximately the gree of foreign object damage or

ssemblies with small diesinker type or carborundum stones. Crocus cloth 2-2) shall be used for final polishing. all not be used. All repairs shall be ished smoothly. The finish strokes of shall be parallel to the longitudinal e.

anes as follows:

s with smooth contours are acceptable , provided they do not exceed maximum (See figure 7-110.)

, burrs, and dents on the airfoil shall red, provided that damage after repair 1/4 vane thickness. (See figure 7-110.)

and dents up to 0.080 inch deep after itted on leading and trailing edges. Length of repair shall be at least twice and not more than four times the depth.

(4) Nicks and dents on vanes in inaccessible areas of repair are acceptable without rework, provided they do not exceed maximum permissible limits.

(5) Bent vanes shall be straightened, using padded pliers or equivalent. If straightening causes a vane to crack, replace vane assembly half.

c. Repair housings as follows:

(1) Remove nicks and burrs from impeller and compressor housings. Touch up reworked areas. (Refer to paragraph 7-143.)

(2) If reinspection of housings does not reveal cracks, refinish blend-repaired areas. (Refer to paragraph 7-143.)

(3) Replace parts that are distorted, cross threaded, or are cracked beyond repair.

CAUTION

Do not remove both compressor housings at same time.

(4) Replace compressor housing if an ear is broken.

(5) Replace both impeller housing halves if crack limits in the housing to air diffuser mounting

hole bosses are exceeded or open cracks are evident.

(6) Refinish painted surfaces. (Refer to paragraph 7-142.)

7-175. REPAIR OF CENTRIFUGAL COMPRESSOR IMPELLER ASSEMBLY. Proceed as follows:

NOTE

No cracks or blade bending are permitted. Length of all repairs must be at least two but not more than four times the depth.

a. If damage to centrifugal compressor impeller exceeds limits given in figure 7-57, or if damage is in critical area, return engine to Overhaul for replacement of impeller.

b. If repair may be accomplished without exceeding limits, repair impeller as follows:

CAUTION

Ensure that foreign material does not enter engine when making repairs.

NOTE

Use small diesinker type files and India or carborundum stone to make repairs. Use crocus cloth (item 23, table 2-2) for final polishing. Do not use power tools. Blend and finish all repairs smoothly. Make finish strokes of all repair work parallel to length of blade. If repair is made on leading edge of blade, blend leading edge and trailing edge of blade to smooth radii as part of repair.

(1) Nicks are not allowed in blade critical area. (See figure 7-57.) Smooth dents are permitted, provided they do not exceed 0.040 inch diameter and 0.010 inch depth.

NOTE

No repair is allowed in critical area.

(2) Repair damage on leading edge of blade, provided depth does not exceed 0.130 inch.

(3) Repair damage on trailing edge of blade, provided depth does not exceed 0.050 inch.

NOTE

Distance between repaired areas must be equal to or greater than length of shortest repair.

(4) Repair damage on blade tip, provided depth does not exceed 0.050 inch.

NOTE

Distance between repaired areas must be at least 1/4 inch. Tip clearances must be maintained as specified in paragraph 9-14.

(5) Repair damage to blade airfoil (sides).

(a) Repair depth is governed by blade ness on inducer area (forward of split line). A 0.0 inch blade thickness must remain after repair.

(b) No repair, other than blending of bur is allowed on impeller area (aft of split line). and dents are permitted without repair provided a 0.025 inch blade thickness remains.

NOTE

Distance between defects must be at least 1/4 inch.

(6) Repair damage to blade corners to a sm radius, provided damage is within 0.060 inch of corner.

7-176. REPAIR OF COMPRESSOR ROTOR BLAD (T53-L-7/7A Engines). Proceed as follows:

NOTE

Repairs shall be made with small diesinker type files and India or carborundum stones. Abrasive crocus cloth (item 23, table 2-2) shall be used for final polishing. Power tools shall not be used. All repairs shall be blended and finished smoothly. Lines, scratches, or sharp edges that might cause concentration of stress are not permitted. Finish strokes of all repair work shall be parallel to longitudinal axis of blade. When blade is repaired on leading and trailing edges, edges shall be blended to a smooth radius as part of repair. (For typical compressor rotor blade damage before and after repair, see figure 7-58.) All defects in noncritical areas shall be reworked wi the exception of smooth dents where burrs are not evident.

Perform vibration check on engines that have greater than 20 percent of the total number of blades blend repaired. (Refer to paragraph 10-16.) Engines that do not pass the vibration test requirements shal be shipped to Depot for repair.

If any of the following repair limits are exceeded, replace blades.

a. Finished repairs to the leading or shall be limited as follows:

(1) No repairs are allowed within 1/4 inc blade root. Smooth dents not exceeding 1/32 in longest side and 0.010 inch deep are acceptable out rework.

(2) Maximum allowable repair depth shal 3/32 inch.

NOTE

Maximum allowable repair depth decreases as distance L, figure 7-58, decreases.

(3) Maximum allowable length of repair is four repair depth. Minimum allowable length is depth.

(4) Repairs to damage within 1/8 inch of blade shall be continued to tip. (See figure 7-58.)

(5) If distance between two damaged areas is than 3/32 inch make one blend repair. If distance greater than 3/32 inch make separate repairs.

Finished repairs on blade tip edges shall be as follows:

(1) Maximum allowable repair depth is 3/32

(2) Length of repair shall be at least three repair depth.

(3) If damage is closer to tip edge than 1/16 blend repair to leading or trailing edge, ever applies.

(4) Minimum of one-half of the blade tip chordal must remain after blend repair. (See figure)

Finished repairs to blade airfoil surfaces shall ited as follows:

(1) Minimum airfoil thickness after repair shall percent original thickness.

(2) If distance between two damaged areas is less 32 inch, make one blend-repair. If distance is than 3/32 inch, make separate repairs.

(3) Maximum allowable repair length on blade surfaces shall be 13/32 inch.

(4) Remove scratches or lines in airfoil areas repair limits.

(5) No more than 20 percent of total blade may be removed during repairs.

pair excessive tip shake by replacing locking one of greater thickness indicated as follows:

Plate Number	Thickness (±0.0005 inch)
-100-237-01	0.018 inch
-100-237-02	0.019 inch
-100-237-03	0.020 inch
-100-237-04	0.021 inch
-100-237-05	0.022 inch
-100-237-06	0.023 inch
-100-237-07	0.024 inch
-100-237-08	0.025 inch
-100-237-09	0.026 inch
-100-237-10	0.027 inch
-100-237-11	0.028 inch
-100-237-12	0.029 inch
-100-237-13	0.030 inch

e. If any damage is found in blade within 1/4 inch from blade root in any area, replace blade.

f. If tip shake cannot be eliminated, replace blade.

g. Repair blade that protrudes further than 0.015 inch forward or aft of disc face as follows:

(1) Remove blade and inspect pin. (Refer to paragraph 7-178.)

(2) Using locking plate of proper thickness as indicated in preceding step d., reinstall blade. (Refer to paragraph 7-178.)

h. If damage or repair dimensions exceed allowable limits, replace blade.

i. Replace bent or distorted blades.

j. Remove varnish on airfoil surfaces as follows:

NOTE

Lapping compound is prepared by mixing one part aluminum oxide, Grade 400, (item 5, table 2-2) by volume with three parts cutting oil (item 24, table 2-2).

CAUTION

Make sure that blades are rubbed only in a radial direction (parallel to leading edge).

(1) Place lapping compound on soft cotton cloth.

(2) Using thin piece of wood or plastic to support the cloth, rub coated blades to remove varnish buildup.

(3) Reinspect all blades to ensure that varnish buildup has been completely removed. Repeat preceding steps (1) and (2), if necessary.

(4) Remove all traces of lapping compound with soft cotton cloth moistened with drycleaning solvent (item 28, table 2-2).

7-177. REPAIR OF COMPRESSOR ROTOR BLADES (T53-L-15/701 Engines.)

NOTE

Repairs shall be made with small diesinker type files and India or carborundum stones. Crocus cloth (item 23, table 2-2) shall be used for final polishing. Power tools shall not be used. All repairs shall be blended and finished smoothly. Lines, scratches, or sharp edges that might cause a concentration of stress are not permitted. Finish strokes of all repair work shall be parallel to longitudinal axis of blade. When blade is repaired on leading and trailing edges, edges shall be blended to a smooth radius as part of repair. (For typical compressor rotor blade damage before and after repair, see figure 7-59.)

NOTE

All defects in noncritical areas shall be repaired with the exception of smooth dents where burrs are not evident.

On engines that have had greater than 20 percent of the total number of blades blend repaired to the maximum limits, perform vibration check as outlined in paragraph 10-16. Engines that do not pass vibration test requirements shall be shipped to Overhaul.

a. Finished repairs to leading or trailing edges (see figure 7-59) shall be limited as follows:

(1) No repairs or damage allowed within first 1/2 inch blade span as measured from blade root in any area on first and second stage blades. (See figure 7-59.) Smooth dents not exceeding 1/32 inch on longest side and 0.010 inch deep are acceptable without rework.

(2) No repairs are allowed within 1/4 inch from blade root in any area on third, fourth, and fifth stage blades. Smooth dents not exceeding 1/32 inch on the longest side and 0.010 inch deep are acceptable in the critical area without rework. (See figure 7-59.)

(3) Maximum allowable depth of repair on leading and trailing edges of blades is shown in figure 7-59.

NOTE

Maximum allowable repair depth decreases as distance L, figure 7-59, decreases.

(4) Repairs to damage within 1/8 inch of the blade tip shall be continued to the tip as shown in figure 7-59.

(5) If the distance between damaged areas is less than 3/32 inch, make one blend repair. If the distance between repaired areas is greater than 3/32 inch, make separate repairs.

b. Blend-repair damaged blade tips in accordance with the following limits: (See figure 7-59.)

(1) Maximum allowable repair depth is 3/32 inch.

(2) Length of repair shall be at least three times repair depth.

NOTE

A minimum of one-half of the blade tip's chordal width must remain after repair.

(3) If damage is closer to tip edge than 1/16 inch, blend repair to leading or trailing edge as applicable.

c. Blend-repair damaged blade surfaces in accord-ance with the following limits: (See figure 7-59.)

(1) Minimum airfoil surface after repair shall be 75 percent of original thickness.

(2) Maximum allowable repair length on blade airfoil surfaces shall be 13/32 inch.

(3) Scratches or lines on airfoil surfaces sha be removed within repair limits.

(4) If, in repairing blade damage, more than 20 percent of total blade material would be remove replace blade.

(5) If distance between two damaged areas is less than 3/32 inch, make one blend repair. If distance between repaired areas is greater than 3/32 inch, make separate repairs.

d. Replace blade if damage or repair exceeds limits specified in preceding steps a. through c.

e. (Deleted)

f. (Deleted)

g. Repair blade that protrudes further than 0. inch forward or aft of disc face as follows:

(1) Remove blade and inspect pin. (Refer paragraph 7-179.) (T53-L-15/701 engines.)

(2) Using locking plate of proper thickne indicated in preceding step e., reinstall blade. to paragraph 7-179.) (T53-L-15/701 engines.)

h. If damage or repair dimensions exceed al able limits, replace blade.

i. Remove varnish as follows:

NOTE

Lapping compound is prepared by mixing one part aluminum oxide, Grade 40C, (item 5, table 2-2) by volume with three parts cutting oil (item 24, table 2-2).

CAUTION

Make sure that blades are rubbed only in radial direction (parallel to leading edge).

(1) Place lapping compound on soft cotto

(2) Using thin piece of wood or plastic to support the cloth, rub coated blades to remove varnish buildup.

(3) Reinspect all blades to ensure that buildup has been completely removed. Repeat ceding steps (1) and (2) if necessary.

(4) Remove all traces of lapping compound soft cotton cloth moistened with drycleaning (item 28, table 2-2).

GRAPHITE VARNISH COATING OF COM- ROTOR BLADES. Proceed as follows:

Prepare blade roots for coating as follows:

(1) Vapor-degrease blades as outlined in graph 7-6.

(2) Mask airfoil surfaces of blades using two steel plates 1.75 inches wide by 20 inches by 0.060 inch thick and two pieces of rubber inches wide by 18 inches long by 0.125 inch (See figure 7-110A.)

(3) Prepare wet abrasive slurry, 40 percent abrasive (item 58, table 2-2) by volume, water and vapor-blast blades as outlined in graph 7-9.

NOTE

Slurry shall be agitated or circulated in such a manner to prevent settling of abrasive.

(4) Remove masking and rinse first with cold water then with hot water heated to 160° F (71° C) minimum. Dry in oven for 10 minutes at 335° F (168° C).

NOTE

Do not slush in oil.

b. Prepare and apply graphite-varnish coating as follows:

(1) Using cardboard masks 2 inches wide by 20 inches long, mask airfoil surfaces. (See figure 7-110B.)

(2) Mix one part corrosion preventive synthetic resin varnish (item 22A, table 2-2) with two parts graphite colloidal (item 52A, table 2-2) in alcohol dispersion (amyl, butyl, or iso-propyl alcohol base, graphite colloidal 18 to 22 percent by weight).

(3) Apply graphite varnish as follows: (See figure 7-110C.)

(a) Using a Binks spray gun equipped with nozzle 66SD (Binks Company or equivalent) at an air pressure of 30 psig, make passes at a moderate speed approximately 8 inches from blades.

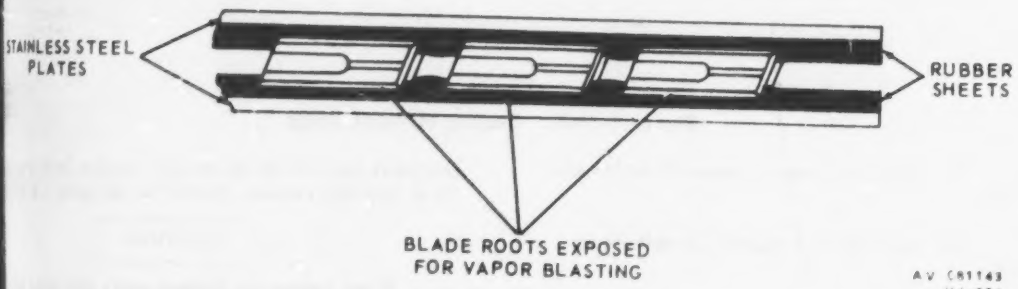


Figure 7-110A. Masking Airfoil Surfaces in Preparation for Vapor-Blasting of Blade Roots

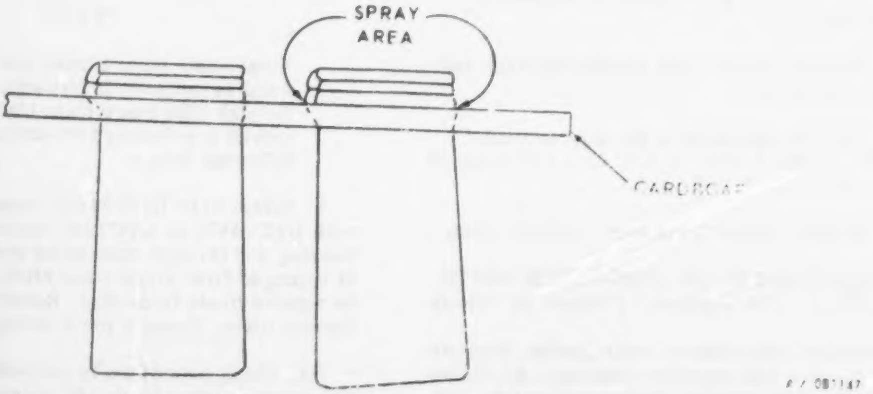
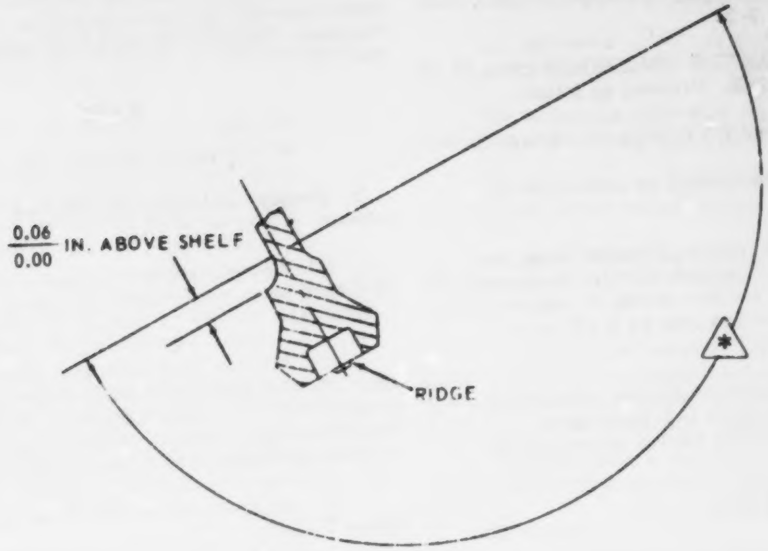


Figure 7-110B. Masking Shield Preparation Prior to Spraying Blade Roots



△* COAT ENTIRE BLADE ROOT AREA AS SHOWN

Figure 7-110C. Coating of Blade Roots

(b) Make one pass in each direction on each side.

(c) Wait 3 to 4 minutes for solvent to evaporate.

(d) Make one pass in each direction on each side.

(e) Air-dry for at least 15 minutes or until dry to touch.

(4) Remove blades from cardboard mask and arrange in oven rack.

(5) Cure by heating in a hot-air circulated oven to 325° to 345° F (163° to 174° C) for 50 minutes or 300° F (140° C) for 1 to 2 hours.

(6) Remove blades from oven, and air-cool.

7-178. REPLACEMENT OF COMPRESSOR ROTOR BLADES (T53-L-7/7A Engines.) Proceed as follows:

a. Removal of compressor rotor blades. Remove upper compressor and impeller housings. All blades replaced in the field shall be replaced in pairs, 180 degrees apart, using special field (short-type) blade sets. Any number of blades may be changed in all stages of the compressor rotor assembly, provided the total number of blades per engine does not e 50 at any one repair. (Refer to paragraph 3-57.

CAUTION

When removing locking plate use care not to drop plate between inlet guide vane and first stage disc or into the compressor housing.

NOTE

First stage rotor blades are removed rea ward as outlined in following step b. Seco through fifth stage rotor blades are removed in a forward direction as outlined i following step c.

b. Insert drift (LTCT1643, used in conjuncti with LTCT4475 or LTCT385) through front of i housing and through inlet guide vane to contact t of damaged first stage rotor blade. Gently tap t to remove blade from disc. Remove and discar locking plate. Remove pin if damaged.

bA. Using procedure in preceding step b., r compressor rotor blade 180 degrees from dam blade.

c. On second through fifth stage rotor blade, use (LTCT1644, used in conjunction with LTCT4475) blade removal tool (LTCT90) and gently tap blade of disc. Remove and discard locking plate. Re- pin if damaged.

d. Using procedure in preceding step c., remove pressor rotor blade 180 degrees from damaged de.

d. Installation of compressor rotor blades. All blades replaced in the field shall be replaced in pairs, 180 degrees apart, using special field (shorter) blade set. Any number of blades may be changed in all stages, provided the total number of blades changed in any one repair cycle does not exceed 50. Following is a list of field replacement blade sets.

Stage	Part Number
First	1-100-236-13 or 1-100-381-02
Second	1-100-241-13 or 1-100-382-02
Third	1-100-243-15 or 1-100-383-02
Fourth	1-100-245-12 or 1-100-384-02
Fifth	1-100-247-12 or 1-100-385-02

NOTE

First stage compressor rotor blades are installed from the rear in a forward direction. The second through fifth stages are installed from the front in a rearward direction. Field replacement blades will carry the symbol "O" vibropeened on rear face of blade root. In event of subsequent damage to one of these blades, it may again be replaced without violating maximum allowable limits. If blade carries symbol "O" with an X through it, that blade has been a field maintenance replacement at one time, but has since been through Overhaul and may now be considered as having no symbol. If replacement blades do not have "O" on blade root they shall be so marked, using a vibropeen marking tool, before they are installed. Depth of marking shall be between 0.001 to 0.006 inch.

CAUTION

If an engine has had more than five sets of blades in any one stage replaced, or if more than 20 percent of the total number of blades have been blend-repaired to maximum limits, a vibration check shall be performed. (Refer to paragraph 10-16.) If vibration limits cannot be met, ship engine to Overhaul.

NOTE

When compressor rotor blades are installed, new locking plates must be used. Visually inspect to ensure that pins are fully installed and not tipped or damaged. If pin was damaged, replace with new pin.

e. If removed, install pin in disc, using pin installer (LTCT256). Ensure pin is bottomed in disc. Carefully position locking plate on pin.

NOTE

Visually inspect to ensure that pins are fully installed and not deformed or otherwise damaged. Pin must protrude a minimum of 0.050 inch.

If interference is noted when installing new blade, remove blade and select a plate with a thickness required to obtain correct fit. If correct fit cannot be obtained by plate selection, use a small file and remove material from tang on base of blade.

f. Using installing tool (LTCT4179) and a force of 80 to 180 pound-inches indicated torque, gently push blade into slot disc until blade comes into contact with pin in center of disc.

g. Bend locking plate against blade root and check to see that it is flush with disc on either side.

h. Check compressor rotor blade tip clearances as outlines in paragraph 9-14.

i. Install compressor and impeller housings. (Refer to paragraph 9-16.)

7-179. REPLACEMENT OF COMPRESSOR ROTOR BLADES (T53-L-701A Engine). Proceed as follows:

a. Removal of compressor rotor blades.

(1) Remove upper compressor and impeller housin (Refer to paragraph 3-57.)

NOTE

The first stage rotor blades are removed rearward as outlined in steps (2) through (3). The second through fifth stage rotor blades of compressor rotor subassembly are removed in a forward direction as outlined in steps (6) through (9).

CAUTION

Make certain to hold locking plate and blades securely to avoid dropping them between the inlet guide vane and first stage compressor rotor disc or into lower compressor rotor housing.

Do not allow tools to contact compressor disc area.

(2) Using drift and soft-faced mallet, straighten locking plate of blade to be removed from first stage

(3) Insert drift (LTCT1643) through front of inlet ing and through inlet guide vane to contact base of damaged first stage rotor blade. Inlet guide vanes m repositioned as necessary to facilitate blade removal ly tap to remove blade form disc. Remove and disc ing plate after removal. Remove pin if damaged.

CAUTION

When a damaged first stage rotor blade is to replaced, the 16th blade located counterclockwise from the damaged blade location, as viewed from rear of first stage rotor disc, m also be replaced to maintain proper rotor balance.

(4) Using procedures in preceding steps (2) and move the 16th blade located counterclockwise from damaged blade location, as viewed from rear of fir rotor.

(5) Repeat procedures in steps (2), (3), and (4) blades that are to be replaced have been removed first stage rotor.

NOTE

Up to 10 sets of blades may be replaced if d age is limited to 10 sets or less. If more th blade sets are damaged, replace all blades

(6) Using drift and soft-faced mallet, straig locking plate to be removed from compressor ro sembly.

(7) On the second through fifth stage rotor blades of pressor rotor subassembly, use drift (LTCT1644) and ly tap blade out of disc. Remove and discard locking after blade removal. Remove pin if damaged. (See fig- 7-111.)

CAUTION

When a damaged second through fifth stage rotor blade is to be replaced by a field replacement blade, the blade located 180 degrees diametrically opposite to the damaged blade must also be replaced to maintain proper rotor balance.

(8) Using procedures in preceding step (6) and (7), re- e rotor blade located 180 degrees diametrically oppo- from damaged blade.

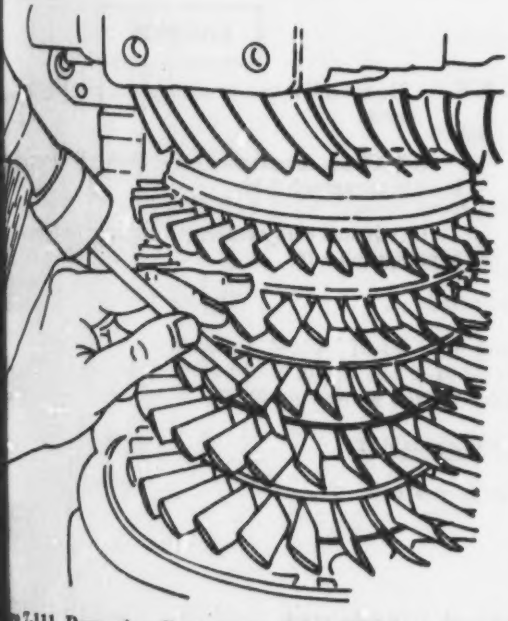
(9) Repeat the procedures in steps (7) and (8) until all s that are to be replaced have been removed from sec- third, fourth or fifth compressor rotor subassembly.

NOTE

On the first and second stages, there is no limit to the number of blade sets that may be replaced.

Installation of compressor rotor blades. All blades ed in the field shall be replaced in pairs, using special (short-type) blade sets. Following is a list of field ement blade sets:

STAGE	PART NUMBER
First	1-100-361-05
Second	1-100-286-08
Third	1-100-383-04
Fourth	1-100-384-04
Fifth	1-100-385-04



e 7-111. Removing Compressor Rotor Blades (T53-L-701A) (Typical)

NOTE

The first stage compressor rotor blades are installed from the rear in a forward direction. Blades of the second through fifth stages are installed from the front in a rearward direction. Field replacement blades will carry the symbol "O" vibropeened on the rear face of the blade root. In the event of subsequent damage to one of these blades, it may again be replaced without violating the maximum allowable limits. If a blade carries the symbol "O" with an X through it, that blade has been a field maintenance replacement at one time but has since been through overhaul and may now be considered as having no symbol. If replacement blades do not have a "O" on the blade root they shall be so marked, using a vibropeen marking tool, before they are installed.

(1) Perform the following steps for blade installation of compressor front shaft assembly (first stage disc.)

NOTE

The compressor front shaft assembly has a complement of 31 blades and requires a special assembly procedure. The following steps must be performed for blade installation of the first stage compressor disc only.

Blade weight to the nearest 0.1 gram is stamped on the convex side of each blade. Two blades marked with equal weights are a set. Blades within 0.1 gram of each other will be considered to be equal weight.

Blades of equal weight are to be kept together.

(a) Blade sets are to be arranged in a row according to ascending weights.

STEP 1

EXAMPLE

Set 1-2-3-4-5-6-7-8*-9-10-11-12-13-14-15

Grams 16.6 16.8 . . . . . 17.6 17.8

*One blade must be added to set number 8 to make this a set of three equal weight blades within 0.2 gram of each other.

(b) Starting with set number 2, remove every other set and with these sets make a second row keeping sets in order to descending weights.

STEP II

EXAMPLE

Row I 1-3-5-7-9-11-13-15

Row II 14-12-10-8*-6-4-2

*Set number 8 has three blades of equal weight within 0.2 gram of each other.

(c) Reposition Row II to the right of Row I to form a single row of blade sets that are in assembly order.

Final Row 1-3-5-7-9-11-13-15-14-12-10-8*-6-4-2

NOTE

Set number 8 has three blades of equal weight within 0.2 gram of each other.

(d) Assemble blades into disc so that each blade is in sequence as shown in figure 7-114.

CAUTION

If a blade must be replaced, replace with matched set. One blade to replace the damaged blade and the other to replace the 16th blade, counting damaged blade as number 1 in counterclockwise direction (viewed from rear of first stage rotor disc.)

NOTE

In following step (2) pin must protrude a minimum of 0.050 inch.

(2) Using pin installer (LTCT256), install new pins if required.

(3) Install locking plate (1-100-505-02) on pin in root of disc.

NOTE

When installing blades, press thumb against blade root until blade is seated against pin.

(4) Using installation tool (LTCT4179), bend tab of locking plate against blade root.

CAUTION

Do not allow tool to contact compressor disc area.

(5) Perform the following steps for installation of se ond through fifth stage blades.

NOTE

Blade sets for each stage are to be selected from random order. No systematic grouping is required.

(6) Assemble blade sets for each stage into proper so that each blade in a set is 180 degrees from its mate.

CAUTION

If a blade must be replaced, replace with a matched blade set.

NOTE

In following step (7), pin must protrude a minimum of 0.050 inch.

(7) Using pin installer (LTCT256), install new pins i quired.

(8) Install locking plate (1-100-505-02) on pin in root disc.

NOTE

When installing blades, press thumb against blade root until blade is seated against pin.

(9) Using installation tool (LTCT4179), bend tab of locking plate against blade root.

CAUTION

Do not allow tool to contact compressor disc area.

(10) Check compressor rotor blade tip clearance as lined in paragraph 9-14.

(11) Install compressor and impeller housing as in paragraph 9-16.

Pages 7-161 through 7-164 deleted.
Figures 7-112 and 7-113 deleted.

NOTE

Visually inspect to ensure that pins are fully installed and are not deformed or otherwise damaged. Pin must protrude a minimum of 0.050 inch.

Select a new blade locking plate of proper thick- to obtain proper installation force as follows:

NOTE

Locking plates 1-100-237-01 to 1-100-237-13 may be reworked to 1-100-296-01 to 1-100-296-13 width configuration by filing 0.030 inch of material from 1-100-237-01 to 1-100-237-13 wider plates. (See figure 7-112.) Locking plates 1-100-296-01 may be reworked to 1-100-299-01 configuration by placing in a suitable pressing fixture and incorporating an indent in the plate as shown in figure 7-113.

jA. Position locking plate on pin.

First, Third, Fourth, and Fifth Stage Disc Assemblies, use the following locking plates:

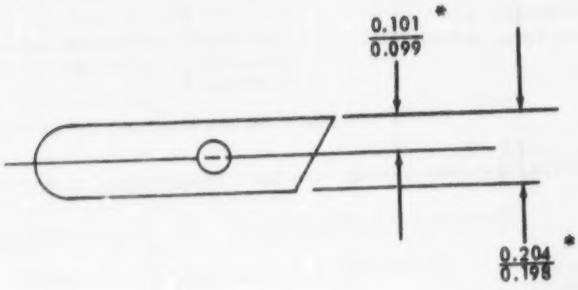
Part Number	Thickness (±0.005 inch)	Installation Force
1-100-237-01 or 1-100-296-01	0.018 inch	80 to 180 lb-in.
1-100-237-02 or 1-100-296-02	0.019 inch	80 to 180 lb-in.
1-100-237-03 or 1-100-296-03	0.020 inch	80 to 180 lb-in.
1-100-237-04 or 1-100-296-04	0.021 inch	80 to 180 lb-in.
1-100-237-05 or 1-100-296-05	0.022 inch	80 to 180 lb-in.
1-100-237-06 or 1-100-296-06	0.023 inch	80 to 180 lb-in.
1-100-237-07 or 1-100-296-07	0.024 inch	80 to 180 lb-in.
1-100-237-08 or 1-100-296-08	0.025 inch	80 to 130 lb-in.
1-100-237-09 or 1-100-296-09	0.026 inch	80 to 180 lb-in.
1-100-237-10 or 1-100-296-10	0.027 inch	80 to 180 lb-in.
1-100-237-11 or 1-100-296-11	0.028 inch	80 to 180 lb-in.
1-100-237-12 or 1-100-296-12	0.029 inch	80 to 180 lb-in.
1-100-237-13 or 1-100-296-13	0.030 inch	80 to 180 lb-in.

cond Stage Disc Assemblies 1-100-710-05 (with plain blades installed), use the following locking plates:

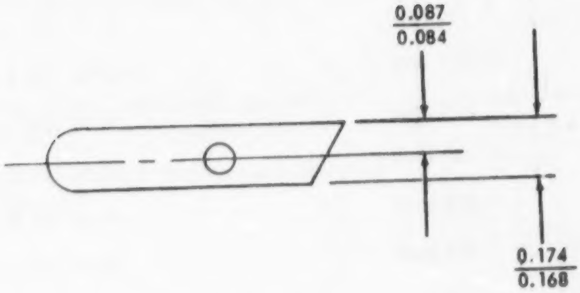
Part Number	Thickness (±0.005 inch)	Installation Force
1-100-296-01 thru -13	Same as Above	80 to 180 lb-in.

cond Stage Disc Assemblies 1-100-710-05 (with graphite varnish-coated blades installed), 1-100-710-09 ied with a ▷ on the rim of the disc), and 1-100-710-10 (completely black anodized or identified with n the rim of the disc), use the following spring-loaded locking plates:

Part Number	Thickness (±0.005 inch)	Installation Force
1-100-299-01	0.016 to 0.018 inch	10 to 70 lb-in.


0.101 / 0.099 *
0.204 / 0.198 *

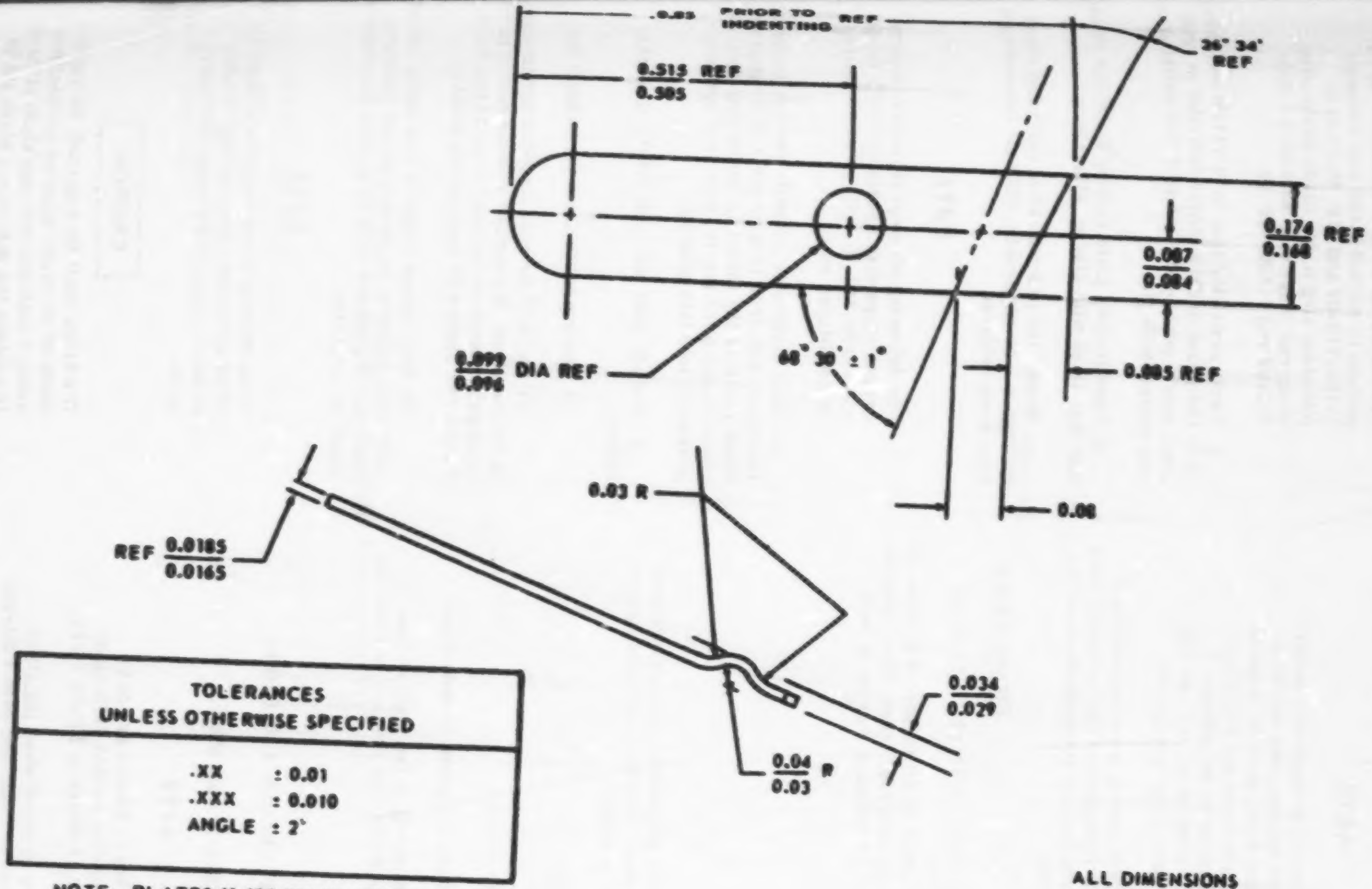
P/N 1-100-237-01 TO -13 WIDTH ☞


0.087 / 0.084
0.174 / 0.168

P/N 1-100-296-01 TO -13 WIDTH ☞

* FILE APPROXIMATELY 0.015 INCH FROM EACH SIDE OF LOCKING PLATE

Figure 7-112. Locking Plate Rework (T53-L-15/701)


0.83 PRIOR TO INDENTING REF
26° 34' REF
0.515 / 0.505 REF
0.174 / 0.168 REF
0.087 / 0.084
0.099 / 0.096 DIA REF
60° 30' ± 1°
0.085 REF
0.08
0.03 R
REF 0.0185 / 0.0165
0.034 / 0.029
0.04 / 0.03 R
TOLERANCES
UNLESS OTHERWISE SPECIFIED
.XX ± 0.01
.XXX ± 0.010
ANGLE ± 2°

NOTE: PLATES (1-100-296-02 THRU -13)
CANNOT BE REWORKED.

ALL DIMENSIONS
ARE IN INCHES

AV 083496
XA-834A

Figure 7-113. Locking Plate Rework for Second Disc Assembly 1-100-710-09 and 1-100-710-10

k. If all blades must be replaced on first stage rotor disc, procure 16 replacement blade sets (1-100-361-03) and group blades prior to installation as outlined in the following steps (1) through (3).

NOTE

> In following step (1) as blade set number 8 requires three blades, take one blade from set number 9 and place it in set 8. Return other blade from set 9 to Depot. Set number 10 becomes set number 9, set number 11 becomes 10, etc., as only 15 sets are required for installation.

(1) Arrange blade sets in a row according to increasing weight. It is suggested that a wooden rack with suitable holes and marked locations be used to assist blade arranging.

	Weight Order	Highest Weight
Set	1-2-3-4-5-6-7-8*-9-10-11-12-13-14-15-16	

*One blade must be added to set number 8 in order to make it a complete set of three blades. Blade weights of set number 8 must be within 0.2 gram of each other.

(2) Starting with set number 14, remove even numbered sets and make a second row keeping sets in order of decreasing weight.

	Weight Order
Row I	1-3-5-7-9-11-13-15
Row II	14-12-10-8*-6-4-2

*Three blade set within 0.2 gram of each other.

(3) Reposition Row II to the right of Row I to form a single row of blade sets that are in assembly order.

Final Weight Order

Final Row 1-3-5-7-9-11-13-15-14-12-10- 8*-6-4-2

*Blade within 0.2 gram of each other.

NOTE

> In following step l., blades are to be assembled into disc so that each blade is in sequence as shown in figure 7-114.
>
> If interference is noted when installing new blade, remove blade and select thinner locking plate or, using a small file, remove material from tang on base of blade. If an excess of material has been removed, use next larger locking plate and reinstall blade.
>
> The following steps l. through n. do not pertain to second stage disc assembly 1-100-710-09 and -10. Proceed to following step o. for blade installation of second stage disc assembly 1-100-710-09 and 1-100-710-10.

l. Using installing tool (LTCT4179) and a force of 80 to 180 pound-inches torque indicated on torque gage, gently push blade into disc slot until blade come into contact with pin.

m. Bend locking plate against blade root and ensur that it is flush with disc on either side.

n. Repeat the procedures of preceding steps l. through m., as applicable, until all removed blades have been replaced.

NOTE

> The following steps o. through r. apply to second stage disc assembly 1-100-710-09 and 1-100-710-10, with graphite varnish-coated blades only.

o. Slide blade with graphite varnish-coated root into blade slot over locking plate to the point when blade contacts the indent in the locking plate. The blade should slide freely, with very light finger pressure, into this position.

p. If blade does not slide freely, proceed as follows:

(1) Remove blade from compressor disc.

(2) Check to be sure graphite varnish coatin is not damaged. If graphite varnish coating has be damaged, recoat as outlined in paragraph 7-177A. Do not use blade with bare metal showing.

(3) Hand-stone ridge on root bottom removi sufficient material to permit proper installation. Removal of graphite varnish coating from bottom o blade is permitted.

NOTE

> If the driving force required is more than 70 pound-inches or less than 10 pound-inches, replace both blade and locking plate.

CAUTION

> If a blade must be replaced, the replacement of the blade must be accomplished using a matched set; one blade of the set to replace the discrepant blade and the other blade 180 degrees from the discrepant blade.

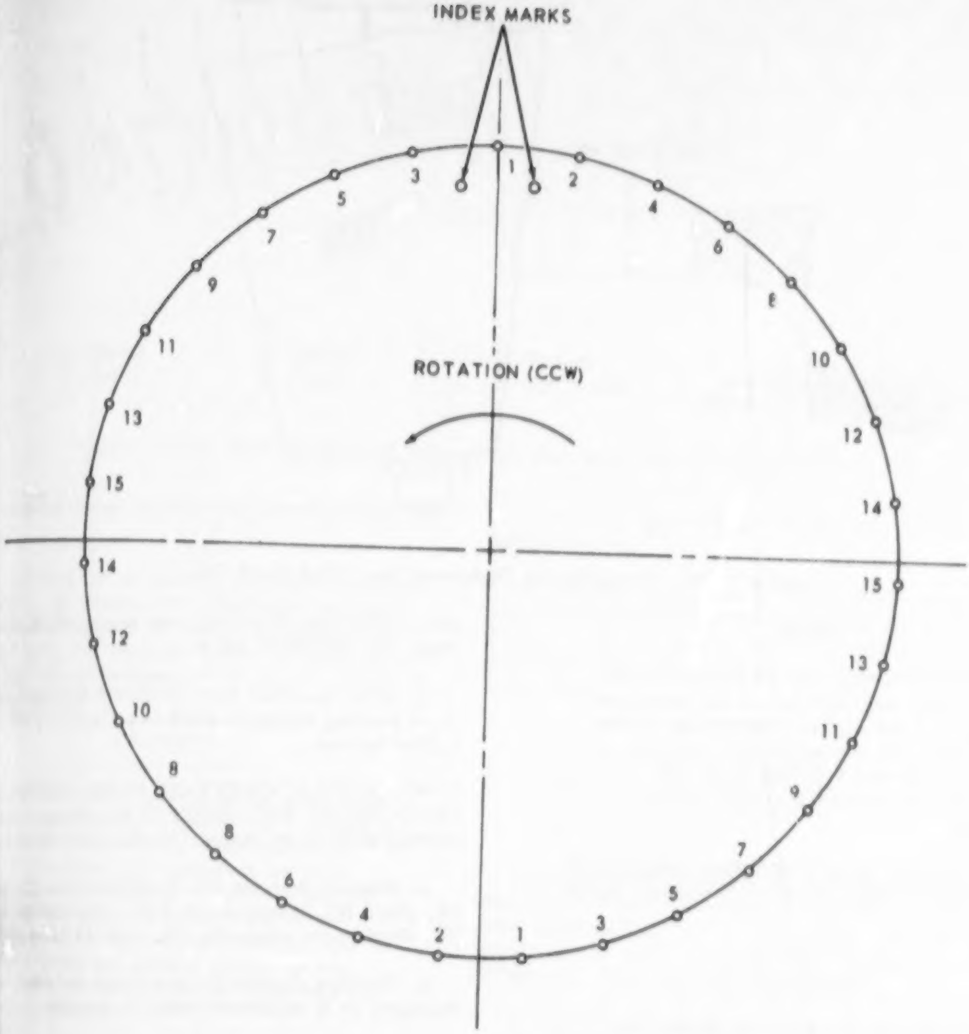

INDEX MARKS
ROTATION (CCW)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
AV 082866
XA 854

Figure 7-114. First Stage Disc Blade Arrangement (T53-L-701A)

EPAIR OF VARIABLE INLET GUIDE VANE BLY (T53-L-15/701 Engines). Distorted vanes can traightened provided no cracks are generated by r. Use a long-handled, duck-billed type of pliers for ing. (See figure 7-115.)

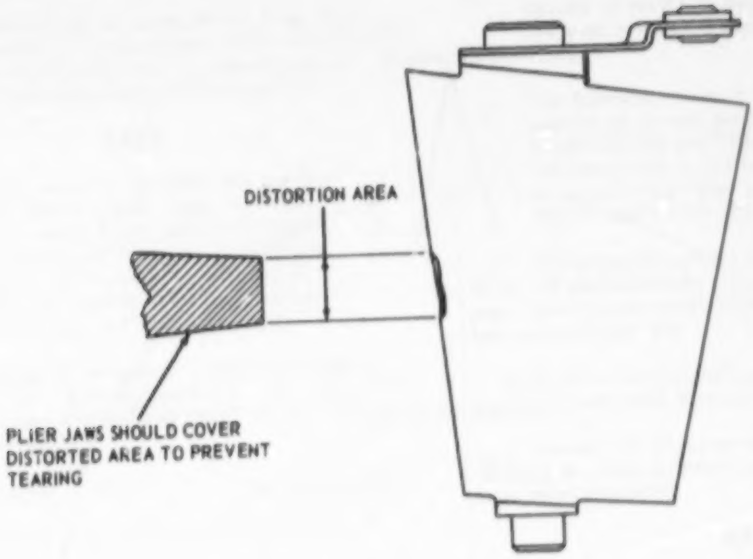


Figure 7-115. Straightening Distorted Vane (T53-L-15/701)

NOTE

Cold straightening may be accomplished from either the inlet end or the compressor side of the engine. First stage blades and lower half of compressor housing may be removed in accordance with existing requirements to gain better access.

7-181. REPAIR OF INLET HOUSING ASSEMBLY. Replace defective studs on forward housing flange as follows:

CAUTION

When installing or removing studs, use care to grip only flat surfaces of stud.

a. If stud is broken off below surface of flange drill out damaged stud, using 3/16-inch drill. This will allow sufficient wall thickness to permit use of bolt extractor.

b. If stud is broken off 1/2 inch or more above flange, remove with vise grip.

c. Remove metal particles from stud hole, using clean dry compressed air.

d. Coat threads of new stud with zinc-chromate primer (item 127, table 2-2).

e. Thread stud into housing approximately 1/2 inch. Tighten stud to 50 to 110 pound-inches torque.

f. If required torque cannot be obtained, use first oversized stud, P/N STD3001 B21N. If required torque still cannot be obtained, use a second oversi stud, P/N STD3001 B21P.

g. After stud has been properly tightened, d from housing flange to stud end shall be 1.5600 t 1.5800 inches.

7-182. REPLACEMENT OF FUEL CONTROL DRIVE SHAFT AND DRIVE SEAL. Repair fuel c leakage at N1 drive seal as follows: (See figure 7-

a. Remove screws (1). Remove cover (2), s (3), plate (4), thrust washer (5), key washer (6 (7), diaphragm assembly (8), and N1 drive shaf

b. Replace diaphragm assembly and other p damaged or if excessive wear is evident.

c. Install N1 drive shaft (9), diaphragm asse (8), ring (7), key washer (6), thrust washer (5), (4), spring (3), cover (2), and screws (1).

d. Tighten screws as required and stake. (S table 11-3, reference number 89A.)

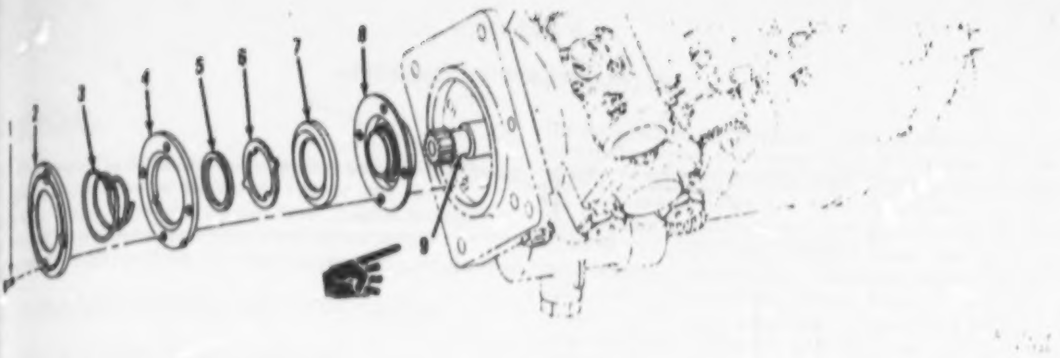
e. After assembly, rotate shaft to check for binding.

7-183. REPAIR OF INLET GUIDE VANE ACTUA ASSEMBLY (T53-L-15/701 Engines). Replace damaged bearing as follows:

CAUTION

Do not damage housing bore.

a. Using suitable drift and mallet, drive bea out of housing.



1. Screw
2. Cover
3. Spring
4. Plate
5. Thrust Washer
6. Key Washer
7. Ring
8. Diaphragm Assembly
9. N1 Drive Shaft

Figure 7-116. Fuel Control N1 Drive Shaft and Drive Seal - Exploded View

Using soft-faced mallet, tap new bearings into ing.

REPAIR OF EXHAUST THERMOCOUPLE MBLY. An exhaust thermocouple assembly as fulfilled functional test requirements of graph 8-31, but exhibits chafed or fraying dame limits shown in figure 7-64 may be repaired. ed as follows:

CAUTION

xtreme caution shall be taken when handling the thermocouple assembly. Excessive flexing of the assembly, specifically at robe locations, can result in internal reakage and shorting. Extreme caution hall be utilized when removing or installing harness on exhaust diffuser (always remove end probes first). Never e pliers or sharp objects on probes or jacent harness.

a. Remove projecting wire strands of braid at damaged area.

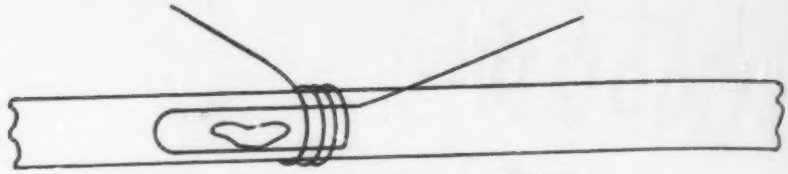
b. Using lockwire (item 60B or 60C, table 2-2), apply and wind around damaged cable as shown in figure 7-117. Wrapping should extend 3/8 inch beyond damaged area. Do not exceed maximum wrap limit shown.

NOTE

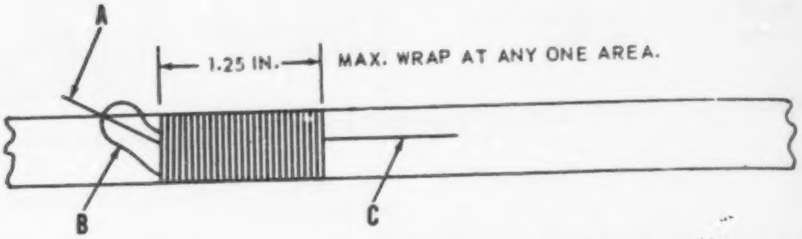
In following step, use care when pulling end "C". Pull only far enough to firmly anchor "A" beneath several wraps of wire.

c. Finish wrap with whip-finish technique by inserting wire end "A" through loop "B". Hold "A" taut while pulling "C" to close loop. Release "A" and carefully pull "C" until "A" is anchored beneath wrapping. Remove excess wire ends.

d. Functional-test exhaust thermocouple assembly in accordance with paragraph 8-31.



APPLY WIRE AND WIND AS SHOWN


A
1.25 IN.
MAX. WRAP AT ANY ONE AREA.
B
C

AFTER WINDING, PUT END "A" THROUGH LOOP "B" PULL END "C".

AV C81079
XA-654

Figure 7-117. Exhaust Thermocouple Assembly - Repair of Chafed or Frayed Cable Braid

CHAPTER 8

ASSEMBLY OF SUBASSEMBLIES

GENERAL.

This section contains instructions for assembly
engine subassemblies following repair and re-
ement. Certain pressure and flow checks for the
ous subassemblies are provided. Also included
assembly instructions for the major accessories.

LUBRICANTS AND SEALING COMPOUNDS.

Refer to Chapter 5, paragraph 5-4.

LOCKWIRING.

Refer to Chapter 5, paragraph 5-6.

TORQUE VALUES.

When no special torque values are given in a
mbly procedure, standard torque values shall
y. Standard torque values are specified in table
2.

DIMENSIONAL LIMITS.

Refer to Chapter 11, Section II.

ASSEMBLY OF BEVEL GEARS.

Bevel gears are properly mounted in relation
h other when gear pattern and backlash are
in specified limits. Each bevel gear has a reference mounting distance. This distance is a line dimension from the thrust face of one gear to the center line of the mating gear. During initial build-up, laminated shims are used to position gears to the correct mounting distance. The standard procedure is to measure and record shim thickness during disassembly; otherwise it becomes necessary to calculate shim thickness needed. Figure 8-1 shows a typical bevel gear mounting. Figure 8-2 shows typical gear patterns. When a solid shim is required, establish the thickness of the shim as follows:

a. Install laminated shims behind the pinion and behind the gear to obtain the desired tooth bearing and backlash. Laminated shims shall be of the proper ID and OD and laminations shall be 0.002 inch thick.

b. Once the desired tooth bearing and backlash has been obtained, a solid shim of proper thickness shall be used.

c. Reassemble the bevel gears using the solid shims installed in their respective positions.

8-13. MARKING ON MATERIALS SUBJECT TO HIGH TEMPERATURES.

8-14. Refer to Chapter 3, Section II, paragraph 3-32.

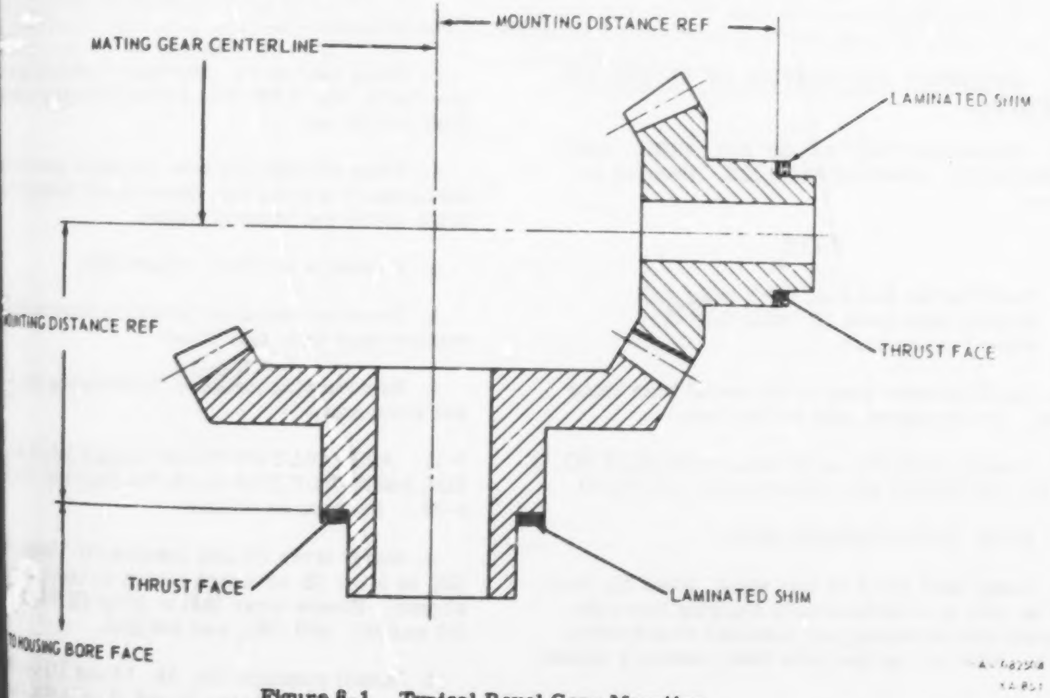


Figure 8-1. Typical Bevel Gear Mounting

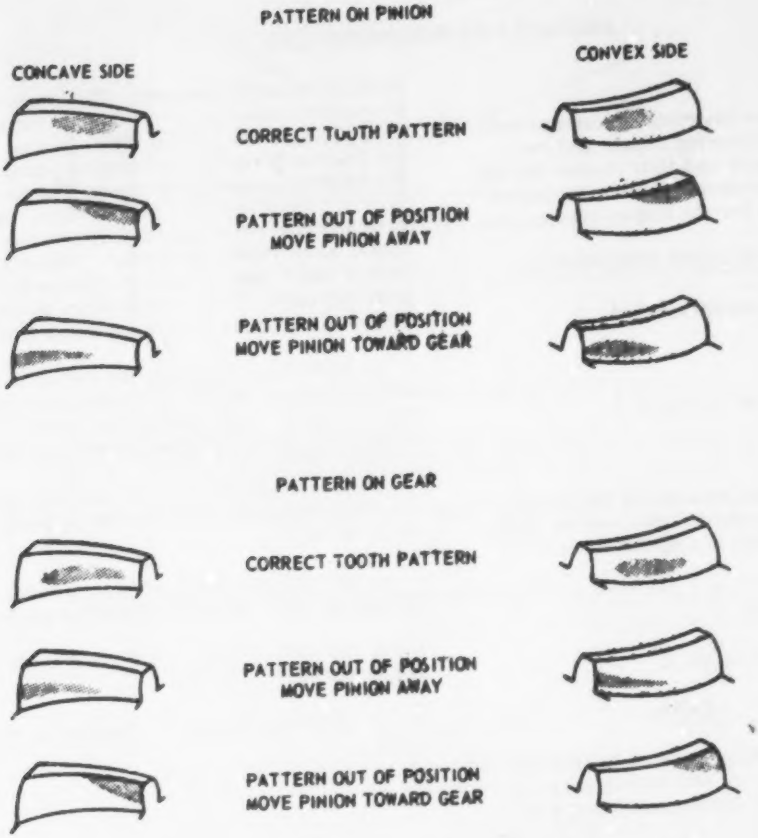

PATTERN ON PINION
CONCAVE SIDE
CONVEX SIDE
CORRECT TOOTH PATTERN
PATTERN OUT OF POSITION MOVE PINION AWAY
PATTERN OUT OF POSITION MOVE PINION TOWARD GEAR
PATTERN ON GEAR
CORRECT TOOTH PATTERN
PATTERN OUT OF POSITION MOVE PINION AWAY
PATTERN OUT OF POSITION MOVE PINION TOWARD GEAR

Figure 8-2. Typical Gear Patterns

8-15. ASSEMBLY AND TESTING OF ENGINE ACCESSORIES.

8-16. PRESSURE TESTING OF AIR, FUEL, AND LUBRICATION HOSE ASSEMBLIES. Proceed as follows.

NOTE

> Perform the following test, using calibrating fluid (item 11, table 2-2) at room temperature.

a. Install suitable plug in one end of hose being tested. Do not tighten plug at this time.

b. Connect opposite end of hose to OUTLET NO. 3 STATIC PRESSURE port of test stand (LTCT314).

c. Close STATIC BYPASS valve.

d. Using hand pump on test stand, bleed air from hose or tube by simultaneously applying hydraulic pressure and loosening plug installed in preceding step a. After all air has been bled, securely tighten plug.

e. Using hand pump, increase hydraulic press unit GAGE NO. 1 STATIC PRESSURE gage indica 2900 to 3100 psi.

f. While maintaining this hydraulic pressure fo maximum of one minute, observe for leakage thr braze joints and braided casing.

g. If leakage is noted, reject hose.

h. Decrease hydraulic pressure to zero psi; th remove hose from test stand.

i. Remove plug installed in preceding step a. and drain hose.

8-17. ASSEMBLY OF INLET GUIDE VANE ACT TOR ASSEMBLY (T53-L-15/701 Engines). (See fi 6-39.) Proceed as follows:

a. Insert lever (2) into housing (7). Install le (23) on lever (2) so match marks on levers are aligned. Secure lever (23) to lever (2) with wash (22 and 24), bolt (25), and nut (21).

b. Install packings (10, 11, 12 and 13) into ho ing (7). Install packings (8 and 9) on piston (14).

Insert piston (14) into housing (7). Insert pin to lever (2), and engage connector (6) with pin. r connector onto piston (14).

NOTE

In following step d., several screws may have to be tried to obtain proper alignment.

Install retainer(5) and secure with screw (4). k for proper alignment of screw slots and con- r (6). (See figure 8-3.)

Using 3/8-inch wrench on hex end of piston, n screw (4, figure 6-39) as required. (Refer le 11-3, reference number 99.) Stake retainer three places as shown in figure 8-3.

NOTE

In following step f., the seal drain port is at a 45-degree angle to the housing.

Using wrench on hex end of piston (14, figure , turn piston so cutout in connector (6) is g toward seal drain port.

Install packing (15) on housing (16). Place g (16) into housing (7). Install retaining ring Insert retainer (18) into housing (7), and align r with housing to allow installation of washer Rotate housing (16) to align screw holes in g with screw holes in retainer (18). Install rs (19) and screws (20). Lockwire screws.

FUNCTIONAL TESTING OF INLET GUIDE ACTUATOR ASSEMBLY (T53-L-15/701 En- . Perform the following test, using calibrating em 11, table 2-2) heated to 70 to 90°F.

a. Connector hose from OUTLET NO. 1 HIGH PRESSURE port of test stand (LTCT314) to drain port on inlet guide vane actuator.

b. Apply pressure to drain port until GAGE NO. 1 HIGH PRESSURE gage indicates 500 psi.

c. With pressure applied to drain port, visually inspect plug adjacent to drain port for leakage. No leakage is allowed.

d. Decrease pressure at drain port to zero. Remove hose.

e. Position two 25 cc beakers under actuator drain port and port No. 1.

f. Connector hose from OUTLET NO. 1 HIGH PRESSURE port to cylinder port No. 2.

g. Apply pressure to port No. 2 until GAGE NO. 1 HIGH PRESSURE gage indicates 500 psi. Maintain pressure for one minute.

h. Inspect actuator for leakage. Leakage through drain port shall not exceed one cc per minute. Leakage through No. 1 cylinder port shall not exceed 10 cc per minute.

i. Decrease pressure at cylinder port No. 2 to zero.

j. Check pressure required to move actuator piston in either direction by applying pressure to port No. 1, and then to port No. 2. Pressure required to move piston shall not exceed 10 psig.

k. Install suitable indicator on actuator. Check stroke of piston by manually moving inlet guide vane actuator lever. Piston stroke shall be within 0.660 to 0.680 inch.

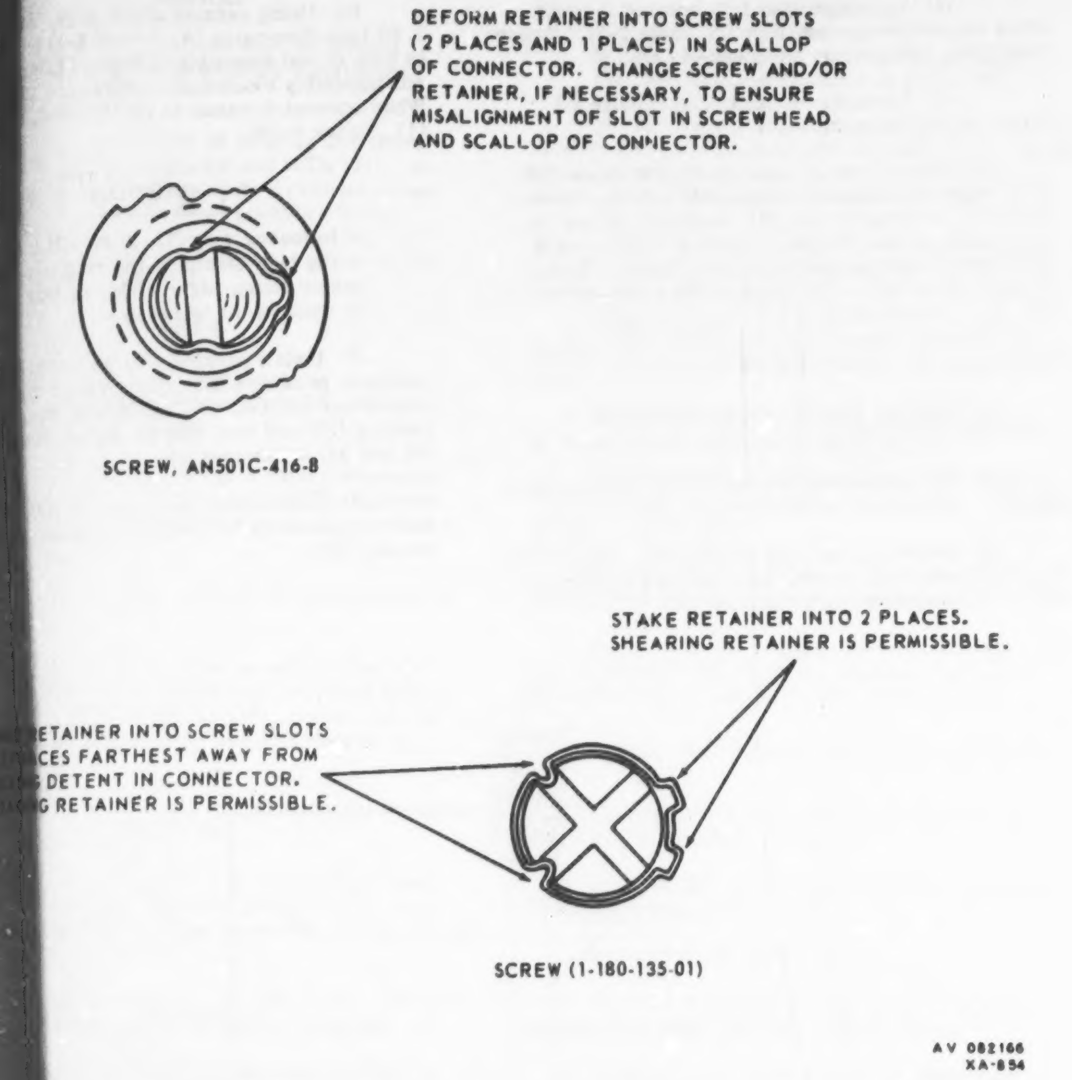

DEFORM RETAINER INTO SCREW SLOTS (2 PLACES AND 1 PLACE) IN SCALLOP OF CONNECTOR. CHANGE SCREW AND/OR RETAINER, IF NECESSARY, TO ENSURE MISALIGNMENT OF SLOT IN SCREW HEAD AND SCALLOP OF CONNECTOR.
SCREW, AN501C-416-8
STAKE RETAINER INTO 2 PLACES. SHEARING RETAINER IS PERMISSIBLE.
ETAINER INTO SCREW SLOTS
CES FARTHEST AWAY FROM
DETENT IN CONNECTOR.
G RETAINER IS PERMISSIBLE.
SCREW (1-180-135-01)
AV 082166
XA-854

Figure 8-3. Staking of Retainer (T53-L-15/701)

l actuators that do not meet preceding

LY OF INTERSTAGE BLEED AC-
MBLIES (T53-L-7/7A Engines) (1-170-
170-050-09). Proceed as follows:

y of interstage bleed actuator 1-170-
igure 6-36.) Proceed as follows:

NOTE

ngs used in this assembly shall
ated with grease (item 53, table
re installation.

(1) Insert spring (18) and strainer assembly (19) into cover (29). Coat packing (20) with grease (item 53, table 2-2); then install packing on reducer (21). Install reducer.

(2) Prepare valve seat (17) for installation as follows:

(a) Install valve seat through oblong hole in cover (29), and position seat with recessed surface facing upward. Install spacer (16), cross-hole end upward, through top of cover and into recess of valve seat (17).

(b) Install bolt (12) and washer (15) through spacer and secure with nut (24).

(c) Lap valve seat into opening in cover, using lapping compound (item 56, table 2-2). Rotate assembly, using wrench on head of bolt.

(d) Disassemble parts and remove all traces of lapping compound.

(3) Secure relay valve cap (11) to cover (29) with washers (4 and 10), springs (3 and 9), washers (2 and 8), screws (23 and 25), washers (22 and 26), and nut (1 and 7). Tighten screws 1-1/2 to 1-3/4 turns after engaging springs (four places). Install packing (6) on union (5). Install union in relay valve cap (11). Install packing (30) on cover (29).

NOTE

In following step (4), do not tighten nut (41) at this time.

(4) Screw rod end bearing (39) onto rod assembly.

(5) Insert rod end into piston (36). Align holes in piston with holes in rod end. Insert pin (35) and secure pin in piston with snapring (37).

(6) Using vernier depth gage, establish a 5.60 inch dimension (A, figure 8-4) from centerli of hole in rod assembly to bottom of piston. Turn rod assembly clockwise to decrease dimension. When correct distance is established, tighten nut (41, figure 6-36).

CAUTION

In following step (7), ensure that the ID of the loop clamp or the ring compressor has no sharp edges or burrs that may cut or damage the teflon seal.

(7) Install packing (32) on piston (36) and s (33) over packing (32). Using ring compressor o loop clamp (RC40C or LTCT4718), compressor packing (32) and seal (33) on piston. Install ring (34 and 38) on piston (36).

(8) Insert guide (44), spring (43), and pist and rod assembly (31) into housing and screw assembly (45).

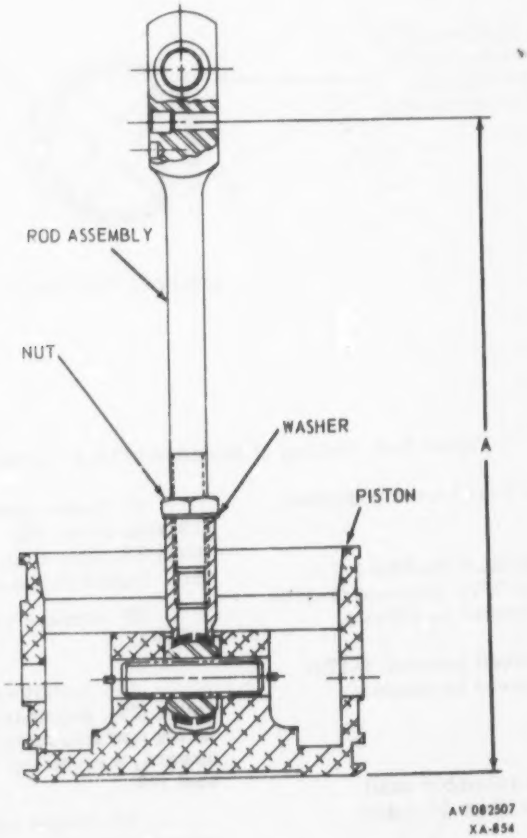


Figure 8-4. Determining Rod Length (Typical)

CAUTION

In following step (9), use care to prevent damage to packing (30) during installation of cover (29).

(9) Secure cover (29) on housing and screw ably (45) with washer (28) and bolts (27). In- ll brackets in place of washers in two positions noted during disassembly. Lockwire bolts.

i. Assembly of interstage bleed actuator 1-170- 00. (See figure 6-37.)

NOTE

All packings used in this assembly shall be lubricated with grease (item 53, table 2-2) before installation.

(1) Insert spring (18) and strainer assembly into cover (29). Coat packing (20) with grease 53, table 2-2), then install packing on reducer l. Install reducer.

(2) Prepare valve seat (17) for installation as ows:

(a) Install valve seat through oblong hole over (29) and position seat with recessed surface ng upward. Install spacer (16), cross-hole end ard, through top of cover and into recess of e seat (17).

(b) Install bolt (12) and washer (15) through er and secure with nut (24).

(c) Seat (17) must be pressure tight when ed. If necessary, lap seat, using lapping com- d (56, table 2-2). Rotate assembly, using wrench ad of bolt.

(d) Disassemble parts, and if seat (17) was d, remove all traces of lapping compound.

(e) Reassemble parts in sequence outlined in ding step (2) with addition of diaphragm and er (13) prior to installation of bolt.

(4) Secure relay valve cap (11) to cover (29) washers (4 and 10), springs (3 and 9), washers 8), nuts (1 and 7), washers (22 and 26), and s (23 and 25). Tighten screws 1-1/2 to 1-3/4 after engaging springs (four places). Install g (6) on union (5). Install union in relay valve 1). Install packing (30) on cover (29).

(5) Install seal (32) over packing (31) on piston

(6) Install spring (34) on seat (35), and install seat on piston, with flared end of seat from piston head.

(7) Insert guide, spring and piston into housing ew assembly (36).

CAUTION

In following step (8), do not damage packing (30) during installation of cover (29).

(8) Secure cover (29) to housing and screw assembly (36) with washers (28) and bolts (27). Install brackets in place of washers in two positions as noted during disassembly. Lockwire bolts.

8-20. FUNCTIONAL TESTING OF INTERSTAGE BLEED ACTUATOR ASSEMBLY (T53-L-7/7A Engines).

Proceed as follows:

a. Place airbleed actuator test fixture (LTCT 10440) on compressor bleed valve test stand (LTCT 421).

b. Secure actuator to test fixture with screws (1, figure 8-5), washers (2) and nuts (3).

c. Connect a No. 6 (3/8-inch diameter) hose to L-2 OUTLET on test stand and install tee, AN824-6, in other end of hose.

d. Connect No. 6 hose from one leg of tee to actuator inlet reducer (21, figure 6-36 and 6-37).

e. Install reducer, AN919-6, in remaining leg of tee and connect No. 4 (1/4-inch diameter) hose from reducer to L-2 GAGE port on test stand.

f. Connect tee (4 figure 8-5) to micrometer (5).

g. Connect No. 4 hose from one leg of tee to union (5, figures 6-36 and 6-37).

h. Connect No. 4 hose from other leg of tee to L-4 GAGE port on test stand.

i. Close vernier control valve.

j. Close L-2 (supply pressure) and L-4 psig (signal pressure) indicator shutoff valves.

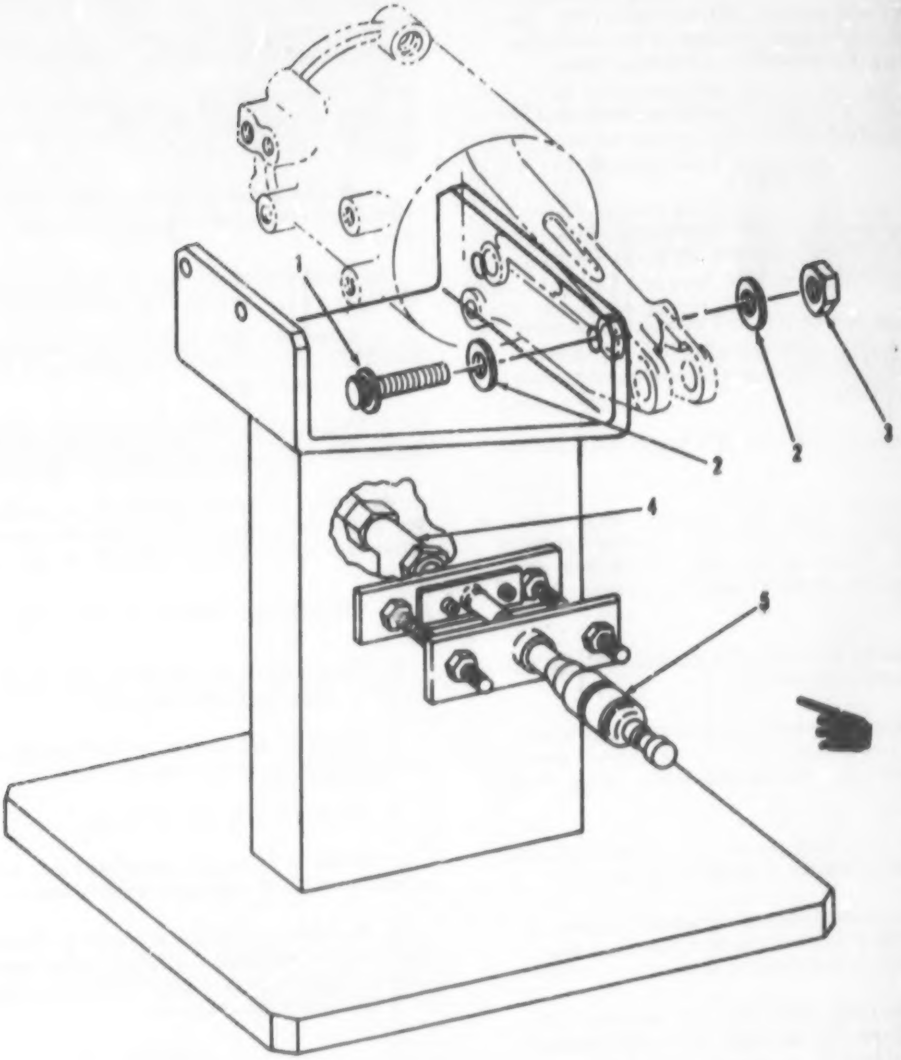
k. Position L-2 selector valve to PRESSURE. Open L-2 PRESSURE CONTROL regulator valve until L-2 gage and L-4 gage indicate pressures of 50 to 70 inches Hg absolute.

NOTE

In following step l., piston should move to extended or closed position when vernier control valve is closed, and move to retracted open position when valve is open. With no pressure applied, piston should be in open position.

l. Open and close vernier control valve several times and observe actuator piston.

m. If sticking or erratic action occurs when performing preceding step l., stop test, disassemble unit (refer to paragraph 6-39), and replace defective parts.



1. Screw
2. Washer
3. Nut
4. Tee, AN825-4
5. Micrometer
6. (Deleted)

Figure 8-5. Interstage Bleed Actuator Assembly Test Setup (Typical)

NOTE

In following step n., leakage is determined by pressure indication on L-4 gage. If gage indicates less than 147 inches Hg absolute, actuator is leaking.

Build L-2 gage pressure to 150 inches Hg lute; then close control valve. Maintain pres- for 3 minutes and observe that pressure, as cated on L-4 gage, is not less than 147 inches Check actuator for leaks.

If leakage is indicated when performing preced- step n., replace defective parts as necessary to leakage.

NOTE

In following step p., L-2 gage readings are plotted along bottom of figure 8-6 and are projected up. L-4 readings are plotted along vertical scale and projected across. The intersection of projected point must fall between the lines marked OPEN and CLOSE. The OPEN and CLOSE on the chart refer to opening and closing operation of actuator piston.

To convert inches of mercury (absolute) to pounds per square inch (gage) pressure shown in figure 8-6, multiply by 0.491 and subtract atmospheric pressure 14.7 psia from result.

With L-2 pressure at 150 inches Hg absolute, vernier valve until piston retracts. Record L-2 gage readings; then check readings curves shown in figure 8-6.

EXAMPLE:

When calibrating closing action of piston, intersection of projected points must fall between CLOSE lines on chart.

Repeat preceding step p., using L-2 pressure inches Hg absolute.

If limits cannot be met, repair or replace

ASSEMBLY OF INTERSTAGE BLEED AC- OR ASSEMBLY (T53-L-15/701 Engines). (See 8-28.) Proceed as follows:

Insert spring (18) and strainer assembly (19) ver (30). Coat packing (20) with grease (item e 2-2). Install packing on reducer (21) and reducer.

Prepare seat (17) for installation as follows:

) Install valve seat through oblong hole in (30), and position seat with recessed surface ward. Install spacer (16), cross-hole end upward, through top of cover and into recess of seat (17).

(2) Install bolt (12) and washer (15) through spacer (16) and secure with nut (24).

(3) Seat (17) must be pressure tight when seated. If necessary, lap seat, using lapping compound (item 56, table 2-2). Rotate assembly, using a wrench on head of bolt.

(4) If seat (17) was lapped, disassemble parts and remove all traces of lapping compound.

c. Install spacer (16), cross-hole end upward, through top of cover and into recess of seat (17).

d. Slide washer (13), diaphragm (14), and washer (15) onto bolt (12).

e. Install bolt (12) through spacer (16), and secure with nut (24).

f. Secure cap (11) to cover (30) with washers (4 and 10), springs (3 and 9), washers (2 and 8), nuts 1 and 7), washers (22 and 26), and screws (23 and 25). Tighten screws 1-1/2 to 1-3/4 turns after engaging springs (four places). Install packing (6) on union (5). Install union in cap (11). Install packing (31) on cover (30).

g. Install seal (33) over packing (32) on piston (34).

h. Install spring (35) on seat (36), and install spring and seat on piston, with flared end of seat away from piston head.

i. Insert guide, spring and piston into housing assembly (37).

CAUTION

Do not damage packing (31) during installation of cover (30) in following step j.

j. Secure cover (30) to housing assembly (37) with washer (28) and bolts (27). Lockwire bolts.

8-22. FUNCTIONAL TESTING OF INTERSTAGE BLEED ACTUATOR ASSEMBLY (T53-L-15/701 Engines). (See figure 8-5.) Proceed as follows:

a. Place interstage bleed actuator test fixture (LTCT10440) on compressor bleed valve test stand (LTCT421).

b. Secure actuator to test fixture with screws (1, figure 8-5) washers (2), and nuts (3).

c. Connect No. 6 (3/8-inch diameter) hose to L-2 OUTLET on test stand, and install tee, AN824-6, in opposite end of hose.

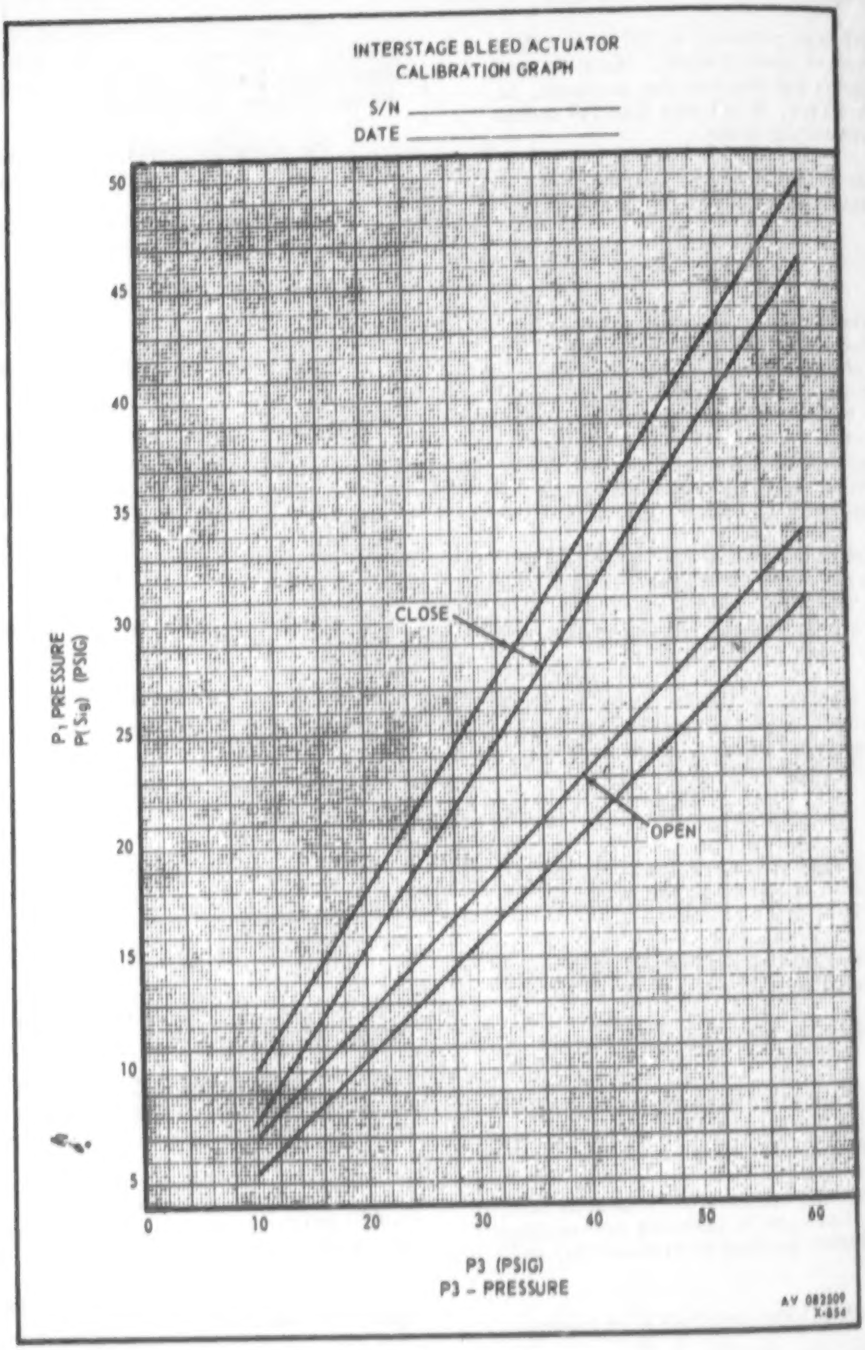


Figure 8-6. Interstage Bleed Actuator Calibration Chart (T53-L-7/7A)

Figure 8-7 deleted.

d. Connect No. 6 hose from one leg of tee to re- cer (31, figure 6-38).

e. Install reducer, AN919-6, in remaining leg of , and connect No. 4 (1/4-inch diameter) hose from cer to L-2 GAGE port on test stand.

f. Connect tee (4, figure 8-5) to micrometer (5).

g. Connect No. 4 (1/4-inch diameter) hose from leg of tee to union (5, figure 6-38).

h. Connect No. 4 hose from opposite leg to tee of 4 GAGE port on test stand.

i. Close vernier control valve.

j. Close L-4 (PSIG) (Signal Pressure) and L-2 ply Pressure) indicator shutoff valves.

k. Turn on test stand. Turn L-2 selector valve to SURE.

l. Open L-2 PRESSURE CONTROL regulator valve l L-4 and L-2 gages indicate pressure to 50 to 70 es Hg absolute pressure.

NOTE

In following step m., piston should move to the extended position when micrometer bleed control valve is closed, and move to the retracted position when the valve is open.

Figure 8-8 deleted.

m. Open and close vernier control valve several times, and observe actuator piston.

n. If sticking or erratic action occurs when performing preceding step m., stop test, disassemble unit, and replace defective part.

NOTE

In following step o., leakage is determined by pressure indication on L-4 gage. If gage indicates less than 147 inches Hg absolute, actuator is leaking.

o. Build L-2 gage pressure to 150 inches Hg absolute; then close micrometer bleed control valve. Maintain this pressure for 3 minutes, and observe that pressure, as indicated on L-4 gage, is not less than 147 inches Hg absolute. Check actuator for leaks.

p. If leakage is indicated when performing preceding step o., replace defective parts as necessary to stop leakage.

hile maintaining L-2 pressure at 90 inches lute (30 psig), open vernier valve until piston . Record L-2 and L-4 gage readings.

NOTE

ernier opening on LTCT10440 must be ithin 0.010 to 0.014 inch.

hile maintaining L-2 pressure at 90 inches olute (30 psig), close vernier valve until piston . Record L-2 and L-4 gage readings.

NOTE

losing pressure must exceed opening ressure by no less than 1.0 psig.

o convert inches of mercury (absolute) the pounds per square inch (gage), mul- ply inches of mercury by 0.491 and sub- act atmospheric pressure (psia) from e result.

eleted)

limits cannot be met, repair or replace ac- sembly.

SSEMBLY OF HOT-AIR SOLENOID VALVE. procedures except external inspection and al test, refer to TM 55-2840-214-40 or TM -223-40.

UNCTIONAL TESTING OF HOT-AIR SOLE- ALVE. Proceed as follows:

ount and secure hot-air solenoid valve in test stand (LTCT316). (See figure 8-9.)

nnect electrical line from HOT AIR VALVE cle on test stand to electrical receptacle on valve and adjust VOLTAGE SELECTOR knob tand to 24 volts dc at ambient temperature.

rn TEST VALVE SYSTEM PRESSURE RE- OR valve No. 8 until TEST VALVE SYSTEM RE gage No. 10 indicates 55 to 65 psi.

rn TEST VALVE INLET CONTROL valve ntil TEST VALVE INLET PRESSURE gage dicates 4 psi.

ctuate HOT AIR VALVE switch No. 42 four ach time checking amperage on AMMETER TOR/HOT AIR VALVE gage No. 19. Amper- dings shall not exceed one ampere.

rn TEST VALVE INLET CONTROL valve ntil TEST VALVE INLET PRESSURE gage ndicates 9.5 to 10.5 psi. Check that TEST OUTLET PRESSURE gage No. 14 indicates minimum.

g. Check that air flow is 0.13 pound per second minimum. Read air flow on ORIFICE DIFFERENTIAL PRESSURE gage No. 11.

h. Actuate HOT AIR VALVE switch once, and observe that amperage on AMMETER DETECTOR/HOT AIR VALVE gage does not exceed one ampere.

i. Turn TEST VALVE INLET CONTROL VALVE until TEST VALVE INLET PRESSURE GAGE No. 13 indicates 19.5 to 20.5 psi. Check that TEST VALVE OUTLET PRESSURE gage No. 14 indicates 13.5 psi minimum.

j. Check that air flow is 0.21 pound per second minimum. Read air flow on ORIFICE DIFFERENTIAL PRESSURE gage No. 11.

k. Actuate HOT AIR VALVE switch once, and observe that amperage on AMMETER DETECTOR/HOT AIR VALVE gage does not exceed one ampere.

l. If limits cannot be met, reject hot-air solenoid valve.

8-25. FUNCTIONAL TESTING OF OIL TEMPERATURE-SENSING BULB. Proceed as follows:

a. Install reference thermometer in test unit (LTCT1452) filled with lubricating oil (item 64, table 2-2). (See figure 8-10.)

b. Heat oil to temperature of 140° to 200°F (60° to 93°C).

NOTE

In following step c., the two test leads connect internally to the OIL TEMP gage.

c. Connect two test leads to POSITIVE and NEGATIVE jacks on external power supply of test stand (LTCT315).

d. Connect test stand lead to temperature bulb.

e. Submerge probe of bulb in heated oil.

f. Observe temperature indications of OIL TEMP indicator and reference thermometer. Reading on OIL TEMP indicator shall be within plus or minus 10°F of reading in reference thermometer. If requirements cannot be met, reject bulb.

8-26. FUNCTIONAL TESTING OF IGNITER PLUGS. Proceed as follows:

a. Install igniter plug in holding fixture (LTCT 896). (See figure 8-11.)

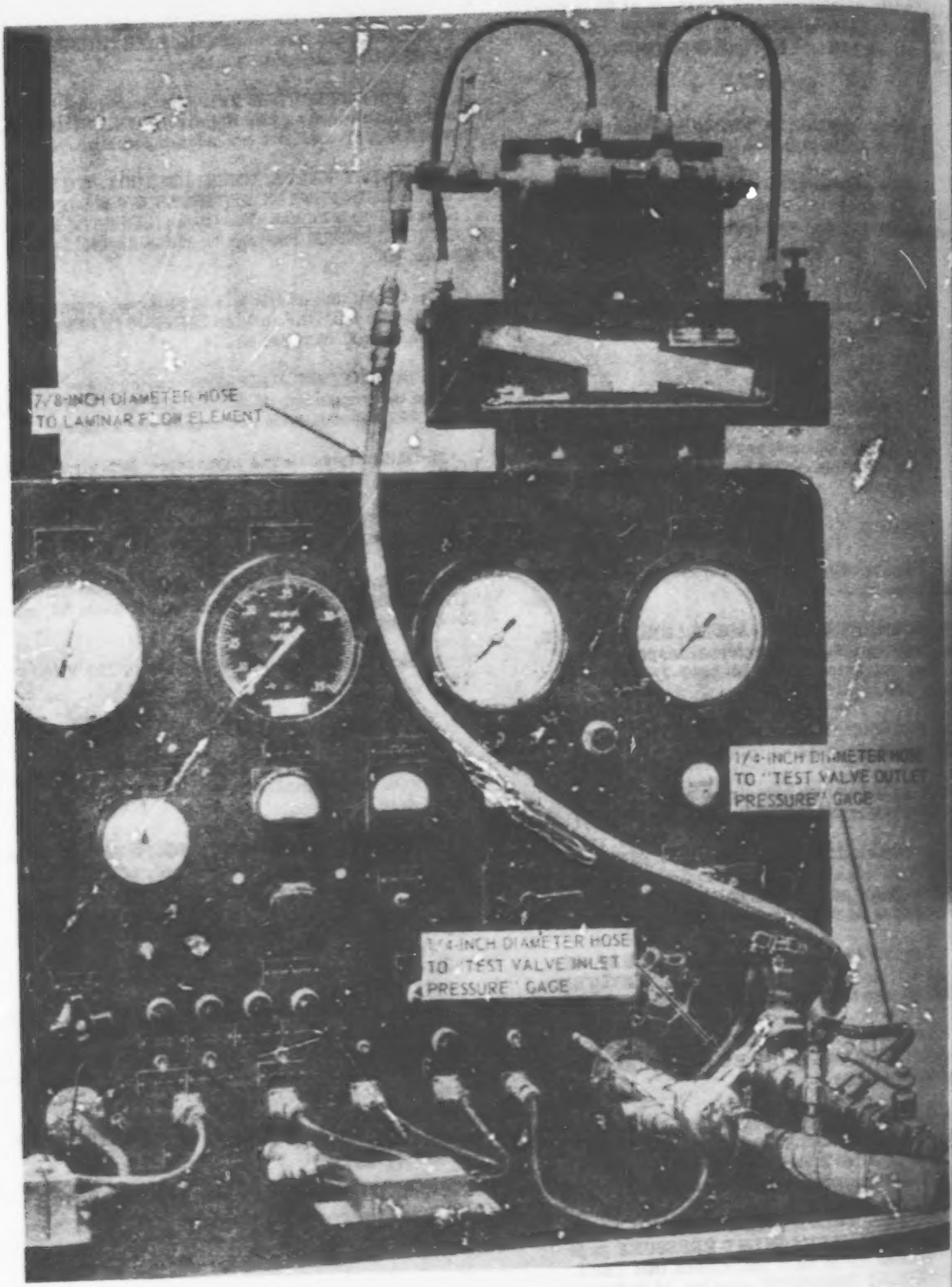
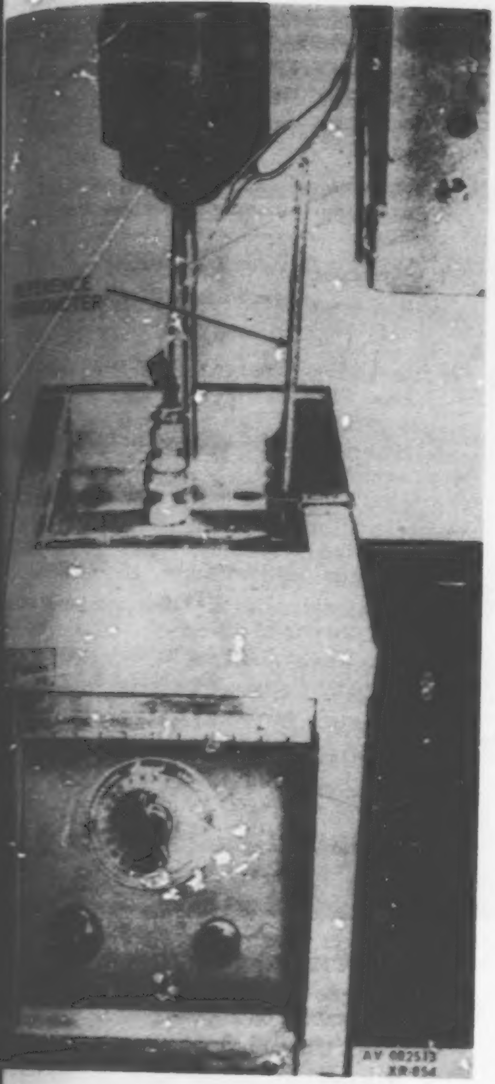

7/8-INCH DIAMETER HOSE
TO LAMINAR FLOW ELEMENT
1/4-INCH DIAMETER HOSE
TO "TEST VALVE OUTLET
PRESSURE" GAGE
1/4-INCH DIAMETER HOSE
TO "TEST VALVE INLET
PRESSURE" GAGE

Figure 8-[illegible] Hot Air Solenoid Valve Test Connections



ure 8-10. Oil Temperature Bulb Test Setup

Attach ground lead from GROUND jacks on test (LTCT315) to bolt on holding fixture. (See 8-11.)

Connect test lead (LTCT10462) between CONN 2 cle and igniter plug.

Position POWER switch to ON. Observe that cator lamp lights.

Turn VOLTAGE SELECTOR switch to H. V.

Turn METER SELECTOR switch to 5 ADC.

Press 60 CYCLE AC button.

Turn TEST SELECTOR switch to L. T. PLUG.

i. Press FILAMENT switch ON. Wait 15 seconds; then press PLATE switch ON. Observe that red indicator lamps light.

j. Turn POTENTIOMETER knob until igniter plug fires without skipping.

k. Press PUSH TO READ switch, and check igniter plug firing voltage on M-8 gage.

l. Apply five consecutive 1800-volt test pulses across the plug. The plug shall fire successfully during each test pulse.

m. Return test unit to pretest conditions, and remove igniter plug from holding fixture.

n. Using suitable adapter pressure, test igniter plug at room temperature by pressurizing firing end at 150 plus or minus 20 psi. Leakage shall not exceed 6 cc/min.

o. If limits cannot be met, replace igniter plug.

8-27. FUNCTIONAL TESTING OF IGNITION UNIT. Proceed as follows:

a. Connect cable assembly (LTCT9272, detail of LTCT315) to CONN 1 (Panel 1) of test stand (LTCT 315).

NOTE

> The inlet terminal of the ignition unit is identified by the absence of the thick insulation.

b. Connect adapter (LTCT9268, detail of LTCT 315) between cable assembly (LTCT9272) and inlet receptacle of ignition unit.

c. Connect two adapters, P/N 11-6532, to outlet receptacles of ignition unit.

d. Connect two test leads (LTCT9277, detail of LTCT315) between adapters, P/N 11-6532, and CONN 3 and CONN 4 receptacles (Panel 5).

Figure 8-11. Igniter Plug Test Setup

e. Connect ground lead from GROUND JACK on test stand to case of ignition unit.

f. Turn POWER switch to ON, VOLTAGE SELECT to DC VOLTS, and METER SEL to 5 ADC. Observe that red indicator lamps light.

g. Press DC button and turn POWER OUTPUT switch to ON.

h. Position power switch on counter panel to ON, and turn counter dial to X1.

i. Turn on external power supply.

j. Turn TEST SELECTOR knob to 2 KV and POLARITY SELECTOR to A.

k. Turn OUTPUT RANGE switch to A.

NOTE

> Following step kA. applies to T53-L-15 and L-701 series engines only.

kA. When testing ignition unit 1-300-245-01 (Scintilla, 10-353700-1), turn COMPENSATOR to 350. When testing ignition unit 1-300-245-02 (GLA 40454), turn COMPENSATOR to 310.

l. Turn OUTPUT SELECTOR to LOW TENSION.

NOTE

> Spark rate shall be 1.5 sparks per second minimum.

m. Using POWER STAT, bring voltage up to 14 as indicated on page M-7. Check sparks per second on gage M-1.

NOTE

> Output voltage shall not be less than 2000 volts (T53-L-7/7A), or 2400 volts (T53-L-15/701).

n. Turn OUTPUT SELECTOR to OUTPUT 1 and read output voltage on gage M-10.

o. Turn OUTPUT SELECTOR to OUTPUT 1, and DISCHARGE CALIBRATE switch to DISCHARGE position.

NOTE

> Spark rate in following step p. shall be 2.8 (T53-L-7 and L-7A series engines) or 2.5 (T53-L-15 and L-701 series engines) per second minimum.

p. Allow ignition unit to cool approximately one minute; then bring unit up to 24 vdc and check for sparks per second on gage M-1.

pA. Check ignition unit for spark emission. Operate ignition unit at each specified voltage input for approximately one minute. When testing ignition unit 1-300-245-01 (Scintilla 10-353700-1), 1-300-363-01 (Scintilla 10-371440-1), observe that spark emission is regular and that no skips are apparent. When testing ignition unit 1-300-245-02 (GLA40454), 1-300-363-02 (GLA42416), irregularities are not reason enough for rejection.

q. If specified requirements cannot be met, replace ignition unit.

8-28. FUNCTIONAL TESTING OF IGNITION LEAD AND COIL ASSEMBLY. Proceed as follows:

a. Place POWER switch on test stand (LTCT315) to ON. Observe that red indicator lamp lights.

b. Position CONTINUITY switch to ON. Observe that red indicator lamp lights.

c. Connect test leads to CONTINUITY jack.

NOTE

> In following step d., red indicator lamp should light and warning buzzer should sound.

d. Momentarily short leads together.

e. Connect one lead to input lead of separator.

NOTE

> In following step f., red indicator lamp should light and warning buzzer should sound.

f. Touch remaining test lead to tips of plug connectors.

g. Check lead shielding for continuity (elec leakage) by tracing shielding with test lead used preceding step f. If indicator lamp lights or war buzzer sounds, reject lead and coil assembly.

h. Connect ground lead from jack to lead and assembly. (See figure 8-12.)

i. Connect lead (LTCT9271, detail of LTCT to L. V. OUTPUT jack. (See figure 8-12.)

j. Turn VOLTAGE SELECTOR to H. V. TE

k. Turn METER SELECTOR to 5 VDC.

l. Press 60 CYCLE AC button, and observe red indicator lamp lights.

m. Position TEST SELECTOR switch to 2 KV.

n. Press FILAMENT switch on. Wait 15 seco then press PLATE switch on.

o. Connect remaining end of lead (LTCT9271, detail of LTCT315) to input lead of lead coil assemb

p. Advance VARIAC knob until a 2000-volt indication is obtained on kilovoltmeter, M-8.

q. Check indicator M-9 for evidence of leakage.

r. If electrical leakage is noted, reject lead and coil assembly.

s. Turn VARIAC knob to 0 and observe kilovoltmeter M-8. As voltage indication passes through 1000 volts, touch lead (LTCT9271, detail of LTCT315) to ground to discharge remaining voltage.

t. Return test set to pretest conditions.

8-29. FUNCTIONAL TESTING OF ELECTRICAL CABLE ASSEMBLIES (T53-L-7/7A/15 Engines). Proceed as follows:

a. Connect electrical cable assembly to test bo of test set (LTCT317). (See figure 8-13.)

b. Connect test board electrical connector to receptacle 1 of test unit. (See figure 8-13.)

c. Connect test unit to 110 vac external power supply.

d. Position AC power switch to ON.

e. Turn TEST SELECTION knob to LO-VOLTA

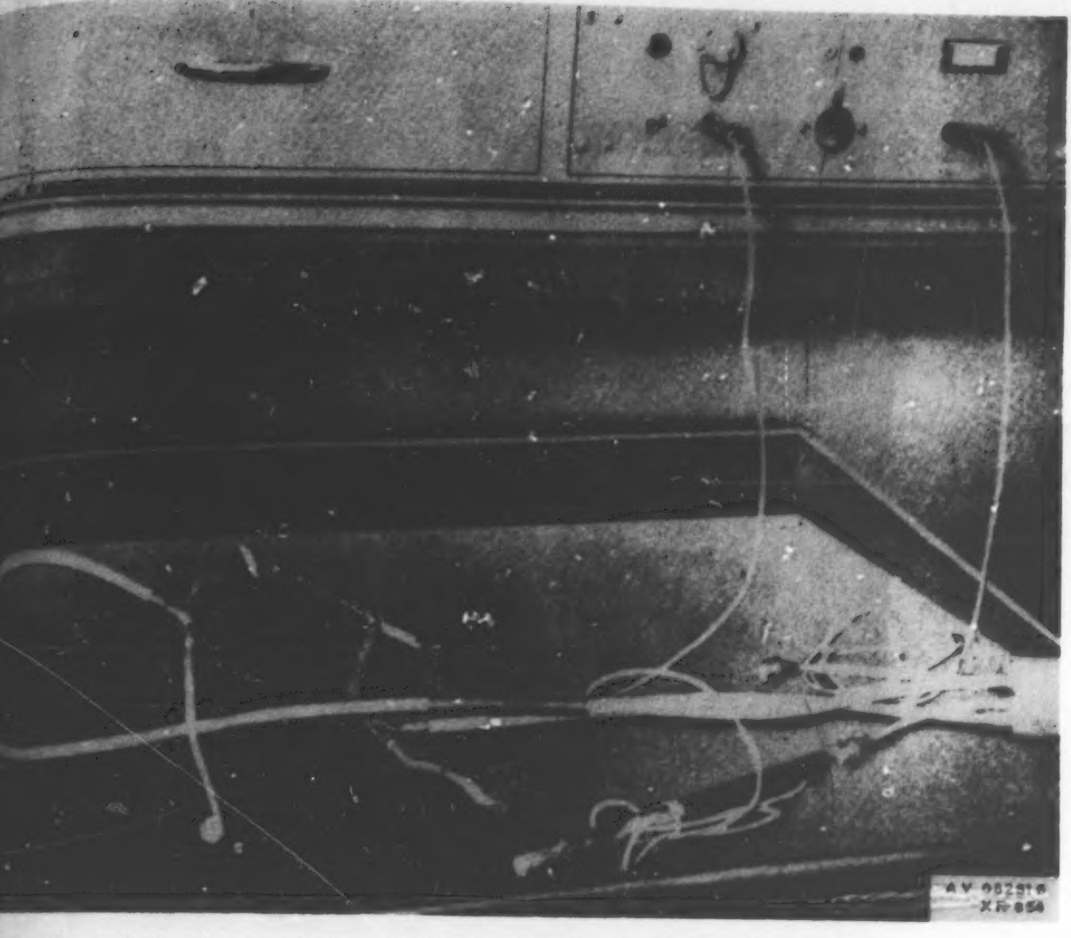


Figure 8-12. Checking Ignition Lead and Coil Assembly for Electrical Leakage

NOTE

n following step f., the automatic sequence f testing should begin. Amber SHORT and OPEN indicator lamps should flicker and ed circuit indicator lamps should flash as e analyzer moves through the test cycle. f a circuit is defective, the amber OPEN r SHORT (whichever is applicable) will reain glowing, and the automatic sequence ill stop. The red indicator lamp will low, identifying the defective circuit.

urn METER SELECTION knob to AUTO-TEST.

eject cable assembly if defective.

ress RESET switch to advance analyzer to rcuit.

urn TEST SELECTION knob to HI-VOLTAGE; peat preceding steps f. and g.

Position AC POWER switch to OFF, dist power source, and remove cable assembly st board.

8-30. FUNCTIONAL TESTING OF ELECTRICAL CABLE ASSEMBLY (T53-L-701 Engine). Not available at this time.

8-31. FUNCTIONAL TESTING OF EXHAUST THERMOCOUPLE ASSEMBLY. Proceed as follows:

CAUTION

Extreme caution shall be taken when handling the thermocouple assembly. Excessive flexing of the thermocouple assembly, specifically at probe locations, can result in internal breakage and shorting. Never use pliers or sharp objects on probes or adjacent harness.

a. Set up three-probe exhaust thermocouple assembly test equipment as follows:

(1) If console tester (LTCT318 or equivalent) is used, connect heater probes test fixture (LTCT 415) or test lead, P/N BH996-40, (Howell Instruments Inc. or equivalent) to console tester.

(2) If Jetcal analyzer, P/N BH112JA-36, (Howell Instruments Inc. or equivalent) is used, connect junction box, P/N BH361-5 or P/N BH361-8, (Howell Instruments Inc. or equivalent) to tester and

Figure 8-13. Electrical Cable Test Unit (T53-L-7/7A/15)

connector heater probes test fixture (LTCT415) or test lead, P/N BH966-40, (Howell Instruments Inc. or equivalent) to junction box.

b. Set up six-probe exhaust thermocouple assembly test equipment as follows:

(1) If console tester (LTCT318 or equivalent) is to be used, connect heater probe element, P/N BH7434-40, to console tester.

(2) If exhaust thermocouple assembly is not installed on engine and Jetcal analyzer, P/N BH112JA-36, is to be used, connect heater probe element, P/N BH7434-40, to junction box, P/N BH361-8. Connect junction box to Jetcal analyzer.

(3) If exhaust thermocouple assembly is installed on engine and Jetcal analyzer, P/N BH112JA36, is to be used, connect heater probe elements P/N BH7434L-40 and P/N BH7434R-40, to junction box, P/N BH361-8. Connect junction box to Jetcal analyzer.

c. Perform functional test.

(1) Connect test cable between exhaust the couple assembly connector and P-2 receptacle o test set.

NOTE

Test set has no ON-OFF switch.

(2) Connect test set to an external 110 va 60-cycle power source.

(3) Set SW-1 switch to RANGE position.

(4) Set SW-2 switch to EXTERNAL T/C position.

NOTE

Potentiometer window should illuminate scale.

(5) Set HEATER PROBE switches L2, and 3, 1 through 6 to ON position.

(6) Set SW-1 switch to MECH. ZERO position.

(7) Adjust POTENTIOMETER knob until pointer icates zero.

(8) Set SW-1 switch to ELEC. ZERO position.

(9) Adjust R-1 knob until pointer indicates ro.

(10) Set SW-1 switch to RANGE position.

(11) Set TEMPERATURE REGULATOR controls 1, and 3, or 1 through 6 to 80 for warmup.

(12) Adjust temperature recorder control until ter is visible.

(13) Touch egt heater probe element No. 1 to h thermocouple individually. Galvometer pointer ld move to right on scale.

(14) Reject exhaust thermocouple assembly if movement or movement to left on scale is ob- rved.

(15) Set SW-2 switch to HEATER PROBE T/C tion.

(16) Install heater probes on thermocouples.

NOTE

In following step (17), after short warmup period, pointer should become visible in illuminated potentiometer window.

(17) Adjust temperature recorder control for to 1130°F (590 to 610°C) indication in recorder w.

(18) Set TEMPERATURE REGULATOR con- 1, 2, and 3, or 1 through 6 and permit pointer [illegible] at temperatures obtained in step (17).

NOTE

The difference between recorded setting obtained in following steps (19) and (21) must not exceed plus or minus 18°F for two used thermocouples or minus 11°F for two new thermocouples.

(19) Adjust temperature recorder control until r indicates zero. Record setting of temperature der control.

(20) Hold SW-2 switch in EXTERNAL T/C n. Permit pointer to stabilize.

(21) Adjust temperature recorder control unit r indicates zero. Record setting of temperature er control.

(22) Allow thermocouple assembly to cool to ambient temperature and connect thermocouple assembly to test set (LTCT317).

(23) Set MULTIPLE CIRCUIT SELECTOR switch to NORMAL.

(24) Set TEST SELECTION to LO VOLTAGE position.

(25) Set METER SELECTION to SHORT RES position.

(26) Set METER RANGE to RX100 position.

(27) Zero ohmmeter.

(28) Record resistance reading on ohmmeter.

(29) If resistance reading is below 400 ohms, reject assembly.

8-32. (Deleted)

8-33. FUNCTIONAL TESTING OF POWER-DRIVEN ROTARY (BOOSTER) PUMP (T53-L-7/7A/15 Engines).

Proceed as follows.

NOTE

Check rear of test stand (LTCT422) for proper internal connections before performing the following test. (See figure 8-14.) Perform test, using lubricating oil (item 63 or 64, table 2-2).

a. Using four bolts, secure pump to drive fixture of test stand. Tighten bolts as necessary.

b. Connect all hoses as follows: (See figure 8-15.)

(1) Connect No. 6 (3/8 inch diameter) hose from MAIN ELEMENT INLET port of test stand to drive fixture.

(2) Connect No. (1/4-inch diameter) hose from SCAVENGE ELEMENT DISCHARGE port on test stand drive fixture.

(3) Connect No. 4 (1/4-inch diameter) hose from SCAVENGE ELEMENT INLET port of test stand to drive fixture.

(4) Connect No. 8 (1/2-inch diameter) hose to MAIN ELEMENT DISCHARGE port of test stand; then install reducer, AN919-12, in open end of hose. Connect No. 6 (3/8-inch diameter) hose from reducer to drive fixture.

NOTE

In following step c., all indicator lamps should light.

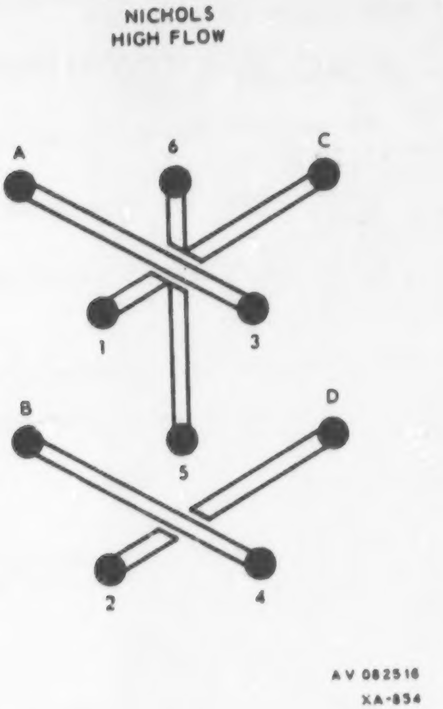


Figure 8-14. Internal Connections of Test Stand When Testing Power-Driven Rotary (Booster) Pump (T53-L-7/7A/15)

c. Press STAND POWER, MOTOR GENERATOR, BOOST CIRCUIT PUMP, and DC DRIVE MOTOR switches on and observe that red indicator lamps light.

d. Turn DRIVE ROTATION SELECTOR knob to CCW.

e. Advance SPEED CONTROL knob until DRIVE SPEED indicator indicates 1500 rpm.

f. Set HEATER switch to ON.

g. Permit test stand lubricating oil to attain operating temperature of 185 to 195°F (85 to 91°C). Read temperature on BOOST PUMP FUEL TEMPERATURE INDICATOR.

NOTE

> In following step h., float should rise partially up tube of rotometer to indicate that pump is primed and circulating fluid.

h. Observe MAIN ELEMENT FLOW rotometer for indication of fluid flow.

i. Open MAIN ELEMENT INLET THROTTLE, PUMP BYPASS, MAIN ELEMENT DISCHARGE PRESSURE, MAIN ELEMENT INLET PRESSURE, SCAVENGE ELEMENT DISCHARGE PRESSURE, SCAVENGE ELEMENT DISCHARGE THROTTLE, and MAIN ELEMENT DISCHARGE THROTTLE val

j. Adjust SCAVENGE INLET PRESSURE valve t maintain zero psi indication on SCAVENGE INLET PRESSURE indicator as SPEED CONTROL knob is advanced to obtain 4150 to 4250 rpm indication on DRIVE SPEED indicator. Observe all remaining indicators and adjust accordingly.

k. Adjust SCAVENGE ELEMENT DISCHARGE THROTTLE valve until SCAVENGE ELEMENT DI CHARGE PRESSURE indicator indicates 49 to 51 p for P/N GC1608 pump, or 59 to 61 psi for P/N RG17670 pump.

l. Observe that fluid flow indicated on SCAV ELEMENT FLOW rotometer exceeds 260 phr if lu cating oil (item 64, table 2-2) is used, or 270 ph if lubricating oil (item 63) is used. If requireme cannot be met, reject pump.

m. Adjust MAIN ELEMENT DISCHARGE THROTTLE valve until MAIN ELEMENT DISCHA PRESSURE indicator indicates discharge pressure of 199 to 201 psi.

n. Adjust PUMP BYPASS valve until MAIN EL MENT INLET PRESSURE indicator indicates 69 to 71 psi.

o. Observe that fluid flow as indicated on MA ELEMENT FLOW rotometer exceeds 520 phr if lubricating oil (item 64, table 2-2) is used, or 54 phr if lubricating oil (item 63, table 2-2) is used. If requirement cannot be met, reject pump.

p. Carefully perform the following simultaneo

(1) Turn PUMP BYPASS valve to bring re indicated on MAIN ELEMENT INLET PRESSURE gage to zero.

(2) Turn SPEED CONTROL knob to zero.

(3) Maintain zero reading on SCAVENGE PUMP gage by turning SCAVENGE ELEMENT D THROTTLE valve.

q. When preceding step p. has been accompli press CIRCUIT PUMP OFF button; this will also shut off DC DRIVE MOTOR system.

r. Remove bolts that secure pump to fixture. move pump.

s. With pump P/N GC 1608, at room temper and drained of excess fluid, the drive shaft sha rotate freely by hand in clockwise and counterc wise directions.

t. With pump P/N RG 17670, at room tempe and drained of excess fluid, the maximum torq quired for drive shaft rotation shall be 24 inch- maximum.

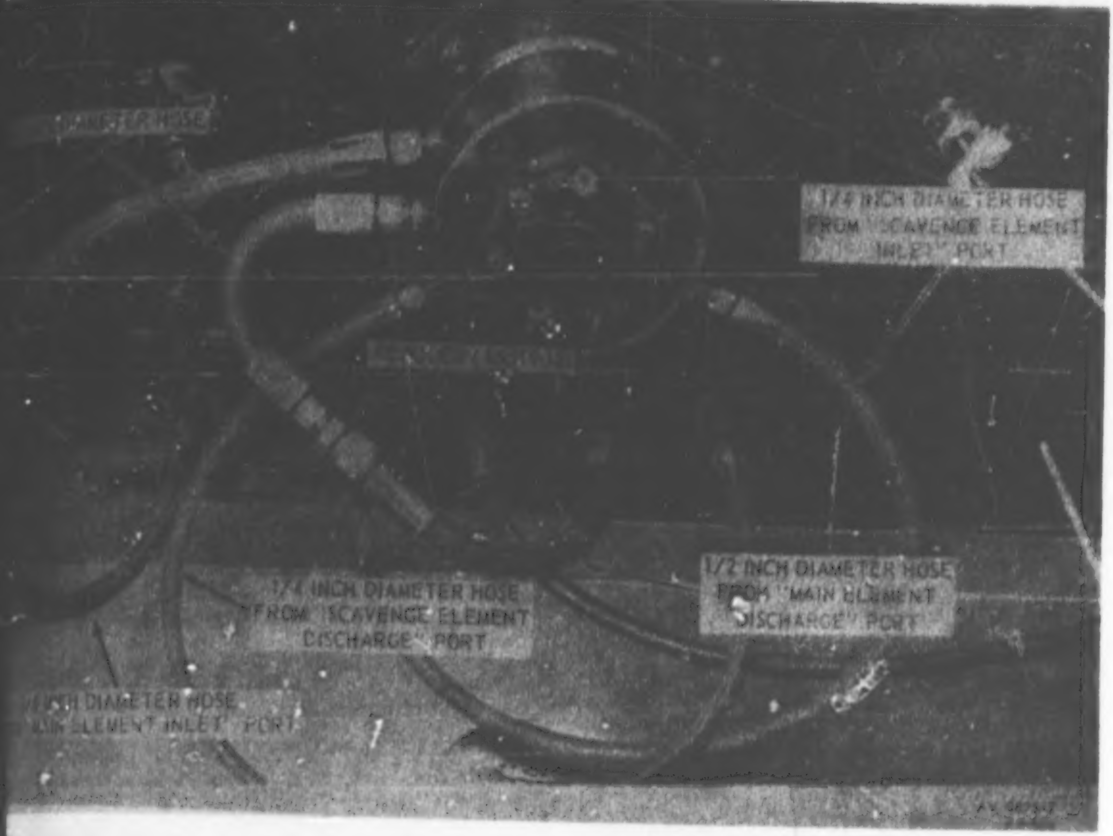

DIAMETER HOSE
1/4 INCH DIAMETER HOSE FROM "SCAVENGE ELEMENT INLET" PORT
1/4 INCH DIAMETER HOSE FROM "SCAVENGE ELEMENT DISCHARGE" PORT
1/2 INCH DIAMETER HOSE FROM "MAIN ELEMENT DISCHARGE" PORT
INCH DIAMETER HOSE
MAIN ELEMENT INLET" PORT

Figure 8-15. Pump Installed on Test Stand (T53-L-7/7A/15)

SSEMBLY OF LUBE OIL FILTER ASSEM-

ee figure 6-35.) Proceed as follows:

stall packing (18) in groove on face of cover

stall washer (19) on bolt (20).

stall bolt (20) through cover (17) and secure (16). Using two wrenches, tighten nut until ns.

arefully install filter elements (13) on cover stall end plate (12) and secure with retaining 1).

e. Install packing (15) in groove on OD of cover (17).

f. Install filter cover assembly (14) into filter housing subassembly (1). Tighten bolt as required. (Refer to table 11-3, reference number 73.) Lockwire bolt to housing.

g. through k. (Deleted)

8-35. FUNCTIONAL TESTING OF LUBE OIL FILTER ASSEMBLY.

Check rear of test stand (LTCT422) for proper internal connections (figure 8-16) before performing following test. Using lubricating oil (item 63 or 64, table 2-2), perform test. Temperature of oil shall be as delivered.

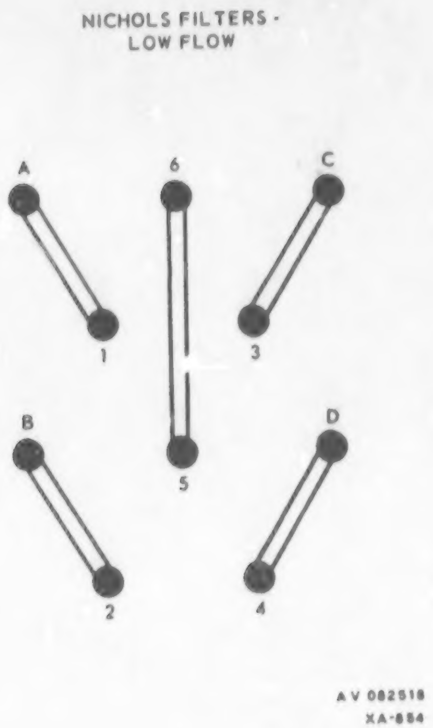


Figure 8-16. Internal Connections of Test Stand When Testing Oil Filter Assembly

a. Position pressure test mounting stand (LTCT 865) on test stand and secure with two nuts. (See figure 8-17.)

b. Connect all hoses and liners as follows: (See figure 8-17.)

(1) Connect No. 10 (5/8-inch diameter) hose between valve to FILTER INLET port on test stand and holding fixture.

(2) Connect No. 10 (5/8-inch diameter) hose between valve to FILTER OUTLET port on test stand and holding fixture.

(3) Connect No. 4 (1/4-inch diameter) hose from fitting in FILTER INLET line to CALIBRATION PORT just below INLET PRESSURE indicator.

(4) Connect No. 4 (1/4-inch diameter) hose from tee fitting in FILTER OUTLET line to valve and adapter at OUTLET PRESSURE indicator.

(5) Connect No. 4 (1/4-inch diameter) hose from HAND PUMP OUTLET port to tee fitting in FILTER INLET line.

c. Press STAND POWER switch. Observe that red indicator lamp lights.

d. Press FILTER CIRCUIT PUMP switch. Observe that red indicator lamp lights.

e. Open FILTER INLET valve.

f. Open FILTER OUTLET valve until
reads 3500 phr flow.

g. Differential pressure across the filter
be 5 psi maximum. If requirements cannot be
reject oil filter.

h. Press FILTER CIRCUIT PUMP switch to OFF.

NOTE

Pressure indication on gages should drop to zero in following step i.

i. Open FILTER INLET valve and bleed off
pressure.

j. Remove cover assembly from filter

k. Install gasket and test plug in housing.

l. Open FILTER OUTLET valve.

m. Press FILTER CIRCUIT PUMP switch
Observe that red indicator lamp lights.

n. Check that impending bypass indicator
on oil filter is depressed. Slowly open FILTER
INLET valve and observe indicator button. Stop
opening valve when indicator button pops out.

o. Observe pressure indication on MAIN ELEMENT DISCHARGE PRESSURE indicator.
pressure should be 9 to 13 psi. If pressure
ment is not met, replace impending bypass
(Refer to Organizational Maintenance manual.)

p. Slowly open FILTER INLET valve and
OUTLET PRESSURE indicator. Stop opening
at first indication of pointer movement.

q. Observe pressure indication on MAIN ELEMENT DISCHARGE PRESSURE indicator.

r. Subtract pressure indication of OUTLET
SURE indicator (preceding step n.) from
on MAIN ELEMENT DISCHARGE PRESSURE
tor (preceding step q.). Difference between
readings shall be within 15 to 20 psi. If
cannot be met, reject lube oil filter assembly.

s. Press FILTER CIRCUIT PUMP switch to

NOTE

Pressure indications should drop to zero in following step t.

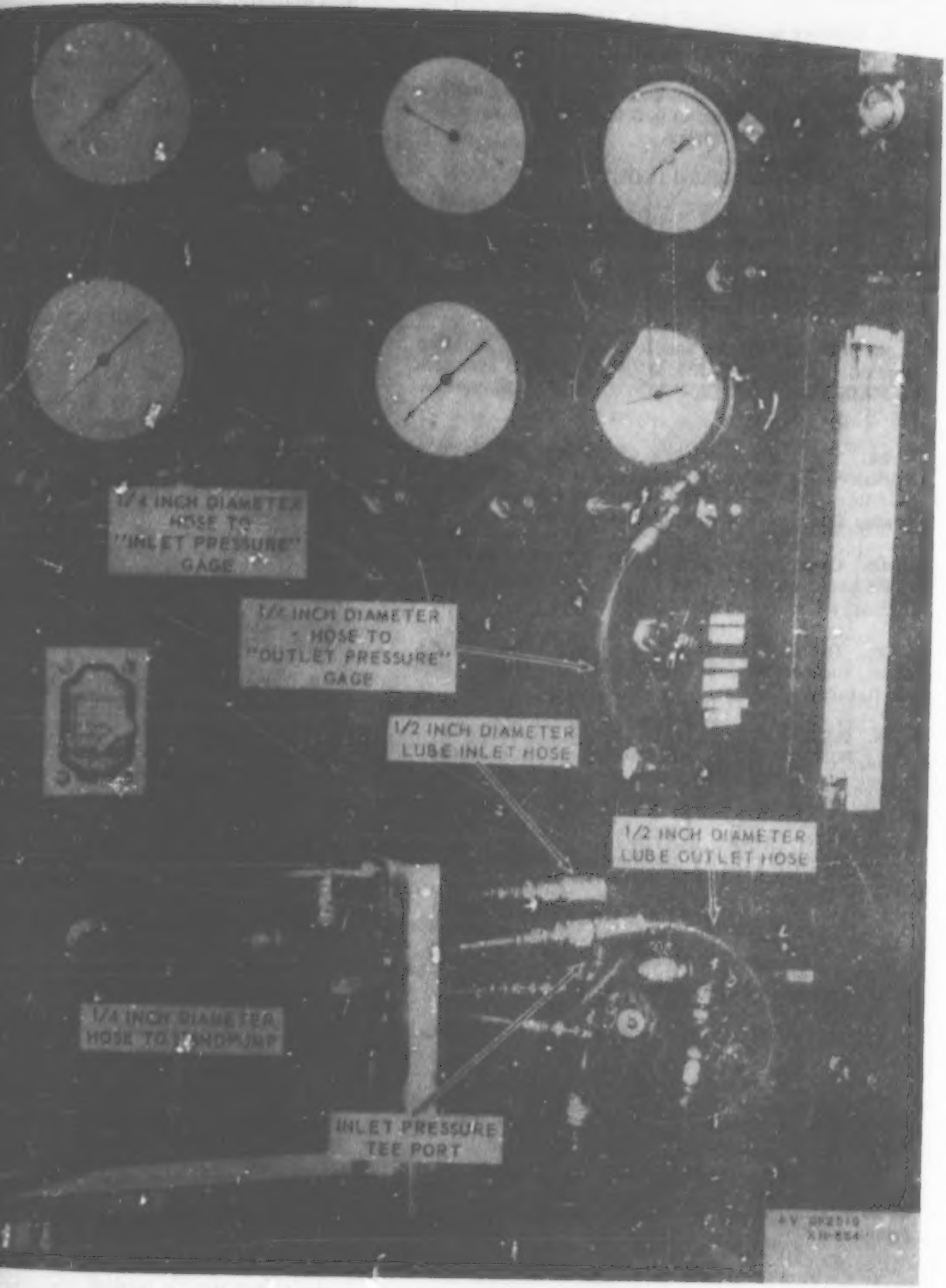

1/4 INCH DIAMETER HOSE TO "INLET PRESSURE" GAGE
1/4 INCH DIAMETER HOSE TO "OUTLET PRESSURE" GAGE
1/2 INCH DIAMETER LUBE INLET HOSE
1/2 INCH DIAMETER LUBE OUTLET HOSE
1/4 INCH DIAMETER HOSE TO HANDPUMP
INLET PRESSURE TEE PORT

Figure 8-17. Oil Filter Assembly Installed on Test Stand

t. Open FILTER INLET valve and bleed off all pressure.

u. Remove test plug and gasket installed in preceding step k.

v. Install cover assembly in filter housing and secure with bolt. Tighten bolt to 25 to 35 pound-inches torque and lockwire.

w. Close valve located in OUTLET PRESSURE gage adapter.

x. Close FILTER INLET and FILTER OUTLET valves.

y. Open HAND PUMP SHUT-OFF valve.

z. Using hand pump handle on test stand, build up hydraulic pressure to 215 to 235 psi. Read pressure on MAIN ELEMENT DISCHARGE PRESSURE indicator.

aa. Visually inspect lube oil filter assembly for evidence of leakage. If leakage is noted, reject lube oil filter assembly. If no leakage is evident, proceed to step ab.

ab. Observe MAIN ELEMENT DISCHARGE PRESSURE indicator while opening FILTER INLET valve to ensure that pressure is bled to zero.

ac. Disconnect all flexible hose and line connections, and remove lube oil filter assembly from holding fixture.

8-36. ASSEMBLY OF POWER-DRIVEN ROTARY (OIL) PUMP. For all procedures, except external inspection and functional test, refer to TM 55-2840-213-40 or TM 55-2840-216-40 as applicable.

8-37. FUNCTIONAL TESTING OF POWER-DRIVEN ROTARY (OIL) PUMP. Perform following test, using lubricating oil (item 63 or 64, table 2-2).

a. Using torque wrench, check that torque on drive shaft does not exceed 3 pound-inches for pump P/N RG-17350; one pound-inch for pump P/N 2407-3, and 65 pound-inches for pump P/N 013973-020-01.

b. Attach 5-foot static head of oil (4 inch Hg.) to lube inlet port of pump.

c. Observe lube oil discharge port on mounting face of pump. Leakage through check valve shall not exceed 2.5 drops during a 3-minute period.

d. Mount rotary (oil) pump on pad of adapter assembly (LTCT423) and secure with four screws. (See figure 8-18.)

e. Connect all hoses as follows: (See figure 8-18.)

(1) Connect No. 12 (3/4 inch diameter) hose from LUBE INLET PORT of test stand (LTCT340) to 1/2 inch diameter adapter connected to oil-in port of oil pump.

(2) Connect No. 4 (1/4 inch diameter) ho from 3 GAGE PORT on test stand to fitting in 1/ inch diameter adapter.

(3) Connect No. 16 (one inch diameter) h from SCAVENGE OUTLET port of test stand to inch diameter adapter connected to oil-out port pump.

(4) Connect No. 4 (1/4 inch diameter) ho from 11 GAGE PORT on test stand to tee fittin one inch diameter adapter.

(5) Connect No. 16 (one inch diameter) h from SCAVENGE INLET port on test stand to scavenge-in adapter of fixture.

(6) Connect No. 4 (1/4 inch diameter) ho from 10 GAGE PORT on test stand to scavenge adapter of fixture.

(7) Connect No. 12 (3/4 inch diameter) from LUBE OUTLET port on test stand to LU OUT adapter of fixture.

(8) Connect No. 4 (1/4 inch diameter) h from 4 GAGE PORT on test stand to LUBE OU adapter of fixture.

f. Press STAND POWER, VACUUM PUMP, CIRCULATING PUMP, and MOTOR GENERAT on (green) buttons. Observe that blue indicato lamps light.

g. Loosen hose connected to LUBE INLET adapter assembly (LTCT423). Bleed air from tem by turning RESERVOIR AIR VACUUM SE TOR lever to AIR. As soon as oil flow is ob place RESERVOIR AIR VACUUM SELECTOR into off position and retighten hose.

h. Turn RESERVOIR AIR VACUUM SELEC lever to VACUUM, and hold until LUBE INLE PRESSURE gage indicates 5 inches Hg vacuu

i. Press DC DRIVE MOTOR ON (green) b Observe that blue indicator lamp lights.

j. Turn SPEED CONTROL COURSE knob DRIVE SPEED gage indicates 400 to 600 rpm. Check LUBE FLOW and rotometer SCAVENG FLOW to ensure there is an oil flow within a mum of 20 seconds.

k. Operate test stand until lubricating oil heated to 180 to 200°F (82 to 93°C)

l. Open pump pressure relief valve until or LUBE OUTLET PRESSURE gage begins to tuate; this indicates that valve is open.

m. Turn pump pressure-relief valve cloc until LUBE INLET PRESSURE gage indicates 0.5 to 0.5 psi, LUBE OUTLET PRESSURE g dicates 100 to 120 psi, and LUBE FLOW roto indicates 3380 phr minimum. Adjust oil flow ing LUBE BACK PRESSURE valve knob.

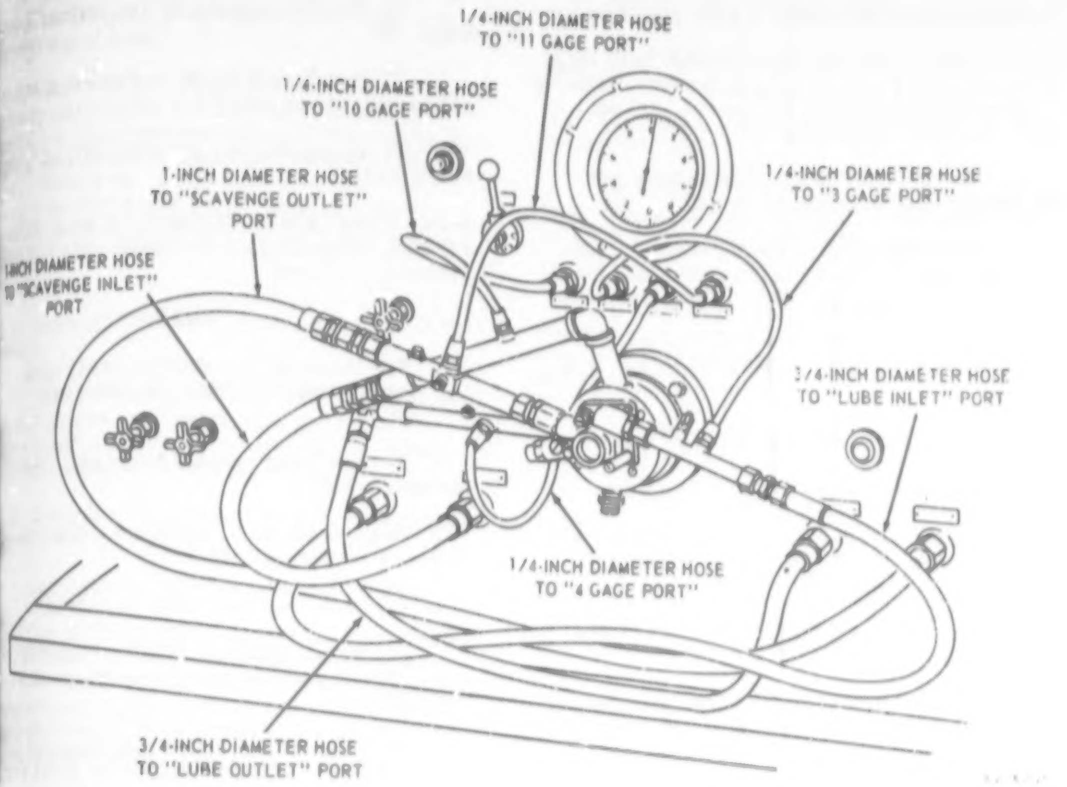

1/4-INCH DIAMETER HOSE TO "11 GAGE PORT"
1/4-INCH DIAMETER HOSE TO "10 GAGE PORT"
1-INCH DIAMETER HOSE TO "SCAVENGE OUTLET" PORT
INCH DIAMETER HOSE TO "SCAVENGE INLET" PORT
1/4-INCH DIAMETER HOSE TO "3 GAGE PORT"
3/4-INCH DIAMETER HOSE TO "LUBE INLET" PORT
1/4-INCH DIAMETER HOSE TO "4 GAGE PORT"
3/4-INCH DIAMETER HOSE TO "LUBE OUTLET" PORT

Figure 8-18. Power-Driven Rotary (Oil) Pump Installed on Test Stand

Turn **SPEED CONTROL COURSE** dial until
SPEED gage indicates 4200 to 4300 rpm.

Turn **RESERVOIR AIR VACUUM SELECTOR**
until **LUBE INLET PRESSURE** gage indicates
0.5 to 0.5 inch Hg vacuum.

Turn **SCAVENGE BACK PRESSURE VALVE**
until **SCAVENGE OUTLET PRESSURE** gage in-
55 to 65 psi. Check **SCAVENGE FLOW**
ter for oil flow of 6720 phr minimum.

Turn **RESERVOIR AIR VACUUM SELECTOR**
to **VACUUM** and hold until **LUBE INLET PRES-**
gage indicates 17.5 to 18.5 inches Hg vacuum.
pressure indicated on **LUBE OUTLET PRES-**
gage. **LUBE FLOW** rotometer shall indicate
of 2830 phr minimum. Record oil flow.

Turn **RESERVOIR AND VACUUM SELECTOR**
to **VACUUM** and hold until **LUBE INLET**
RE gage indicates 22.5 to 23.5 inches Hg
. Record pressure indicated on **LUBE**
T **PRESSURE** gage. **LUBE FLOW** rotometer
licate 2140 phr minimum. Record oil flow.

Turn **RESERVOIR AND VACUUM SELECTOR**
to **VACUUM** and hold until **SCAVENGE INLET**
PRESSURE gage indicates 17.5 to 18.5 inches Hg vacuum. Record pressure indicated on **SCAVENGE OUTLET PRESSURE** gage. **LUBE FLOW** rotometer shall indicate 5720 phr minimum. Record oil flow.

t. Turn **RESERVOIR AIR VACUUM SELECTOR** lever to **VACUUM** and hold until **SCAVENGE INLET PRESSURE** gage indicates 22.5 to 23.5 inches Hg vacuum. Record pressure indicated on **SCAVENGE OUTLET PRESSURE** gage. **LUBE FLOW** rotometer shall indicate 4180 phr minimum. Record oil flow.

u. Bottom the pump relief valve.

NOTE

> In following step v., outlet pressure indication on **LUBE OUTLET PRESSURE** gage must be 110 psig. Inlet pressure indication on **LUBE INLET PRESSURE GAGE** must be zero inch Hg vacuum.

v. Turn **LUBE BACK PRESSURE VALVE** until **LUBE FLOW** rotometer indicates 3610 phr minimum for pumps P/N RG17350 and P/N 2407-3, and 3500 phr minimum for pump P/N 013973-020-04.

w. Replace pump that does not meet requirements.

x. If all limits have been met, provide zero Hg at the inlet pressure port, 110 psig at the lube discharge port, and adjust relief valve for flow of 3450 phr. Secure relief valve adjustment.

y. Turn SPEED CONTROL COURSE knob until DRIVE SPEED gage indicates zero rpm.

z. Turn RESERVOIR AIR/VACUUM SELECTOR lever to AIR: then turn lever to VACUUM side until LUBE AND SCAVENGE OUTLET PRESSURE gages indicate zero.

aa. Push DRIVE MOTO off (red) buttons switch (off).

ab. Push remaining switches off (red) buttons.

ac. Remove power-driven rotary (oil) pump.

8-38. ASSEMBLY OF MAIN FUEL FILTER ASSEMBLY, P/N 123998 AND P/N 045468 (DS AND GS MAINTENANCE). Proceed as follows:

a. Assembly of filter P/N 123998. (See figure 6-33.)

(1) Install packing (13) into base assembly (12). Position pressure switch (17) on base assembly (12) and secure with screws (16). Lockwire screws.

(2) Install plug and bleeder (15) and packing (14).

(3) Install spring (11) into base assembly (12).

(4) Install valve assembly (10), packing (9), gasket (8), and valve retainer (7). Secure with screws (6).

(5) Position packing (4) in groove on body assembly (3).

(6) Position packings (18) on element assembly (5). Insert element assembly into body assembly (3). Install seal (2) and bolt (1).

(7) Tighten bolt as required. (Refer to table 11-3, reference number 69.) Lockwire bolt.

b. Assembly of filter P/N 045468. (See figure 6-34.)

(1) Install packings (14) into head (13). Position switch (15) on head (13) and secure with screws (16). Lockwire screws.

(2) Install plug (17) and packing (18).

(3) Install gasket (2) in head (13).

(4) Install packing (12) on valve (11) and insert spring (10) into nipple (9).

(5) Install nipple (9) into head (13).

(6) Position packing (8) and spring (7) on nipple (9).

(7) Install packing (6) in element assembly and packing (4) on plug (3).

(8) Insert element assembly (5), with plug into bowl (1).

8-39. FUNCTIONAL TESTING OF MAIN FUEL FILTER ASSEMBLY, P/N 123998 AND P/N 0454 Proceed as follows.

NOTE

> The following test is performed, using calibrating fluid (item 11, table 2-2) at 70°F.

a. Remove filter element assembly. (Refer to paragraph 6-34.)

b. Reassemble body, leaving out filter elemen (Refer to paragraph 8-38.).

c. Pressure-test fuel filter as follows:

(1) Install reducer, AN919-10, in FUEL port. Install suitable high-pressure cap on FU OUTLET port.

(2) Connect No. 4 (1/4 inch diameter) ho from reducer to STATIC PRESSURE PORT FUE port of test stand (LTCT1414).

(3) Close STATIC PRESSURE BYPASS FU valve.

(4) Using hand pump on right side of test slowly increase pressure until STATIC TEST PR SURE FUEL gage indicates 100 psi. Maintain th pressure for 1-1/2 to 2-1/2 minutes. After spe time has elapsed, check for evidence of failure, distortion, or leakage.

(5) If requirements cannot be met, reject filter.

(6) Reduce pressure to zero inches water; disconnect hose from filter.

d. Perform pressure switch operation as fol

(1) Install a dummy element assembly in assembly.

(2) Connect power and light source to rec tacle on pressure switch housing.

(3) Connect No. 12 (3/4 inch diameter) ho to PRESSURE FUEL PORT of test stand; then in reducer, AN919-18, in opposite end of hose.

(4) Connect No. 6 (3/8 inch diameter) ho reducer; then install another reducer, AN919-7 opposite end of hose. Connect a 1/4 inch diame adapter to reducer; then connect adapter to FU port of fuel filter.

(5) Connect No. 4 (1/4 inch diameter) hose to pter pressure port; then install a tee, AN824-4, pposite end of hose.

(6) Connect a 1/4 inch diameter flexible hose n tee to GAUGE PORT FUEL 22 of test stand. nect a 1/4 inch diameter adapter from remaining d tee; then install another tee, AN824-4, in pter. Connect No. 4 (1/4 inch diameter) hose n leg to tee to GAUGE PORT 25 of test stand. nect No. 4 (1/4 inch diameter) hose from re- ining leg of tee to water gage (0 to 75 inches r).

(7) Press STAND POWER ON and FUEL PUMP ttons.

(8) Turn BYPASS and BACK PRESSURE CON- OL-FUEL valve until water gage indicates 20 to ches water pressure. Observe light to ensure witch is actuated at this pressure.

(9) If requirements cannot be met, reject fuel r.

Perform bypass valve operation as follows:

(1) Turn BYPASS FUEL and BACK PRESSURE ROL-FUEL valves in small increments until e rate through bypass valve is 8 cc minimum. leakage rate is the cracking pressure of valve, hall occur at 27 to 40 inches water pressure as ted on water gage.

(2) Increase flow to 800 to 820 phr, and observe re drop across filter as indicated by water Pressure drop shall not exceed 49.2 inches of

(3) If requirements cannot be met, reject fuel

(4) Turn BYPASS FUEL and BACK PRESSURE ROL-FUEL valves until pressure returns to ches water. Disconnect hose from fuel filter, move reducer.

Remove dummy element from body assembly.

Reinstall filter element assembly in body ly. (Refer to paragraph 8-38.)

ASSEMBLY OF FUEL HEATER ASSEMBLY. procedures, except external inspection and al test, refer to TM 55-2840-217-40.

FUNCTIONAL TESTING OF FUEL HEATER BLY. Proceed as follows.

NOTE

e following tests are performed, using bricating oil (item 63 or 64, table 2-2), r calibrating fluid (item 11, table 2-2) ated from 60 to 120°F unless otherwise pecified.

a. Fuel Circuit Pressure Test. (See figure 8-19.)

(1) Install reducer, AN919-10, in FUEL IN port.

(2) Install fixture in FUEL OUT port, and secure with nut.

(3) Connect a No. 4 (1/4 inch diameter) hose from reducer at FUEL IN port of fuel heater to STATIC PRESSURE PORT FUEL port of test stand (LTCT1414).

(4) Using fuel hand pump on right side of test stand, supply calibrating fluid to fuel heater fuel chamber until fuel begins to discharge from FUEL OUT port.

(5) Using suitable cap, cap off fixture at FUEL OUT port.

(6) Ensure that oil side of fuel heater is open to vent.

(7) Using fuel hand pump on right side of test stand, build up pressure in heater fuel chamber at a rate of 100 psi per minute until STATIC TEST PRESSURE FUEL gage indicates 200 psi.

(8) Maintain applied pressure for 5 minutes. After 5 minutes elapsed time, fuel heater shall show no evidence of failure, malfunction, distortion, or unsatisfactory leakage.

(9) Bleed off 200 psig pressure to zero.

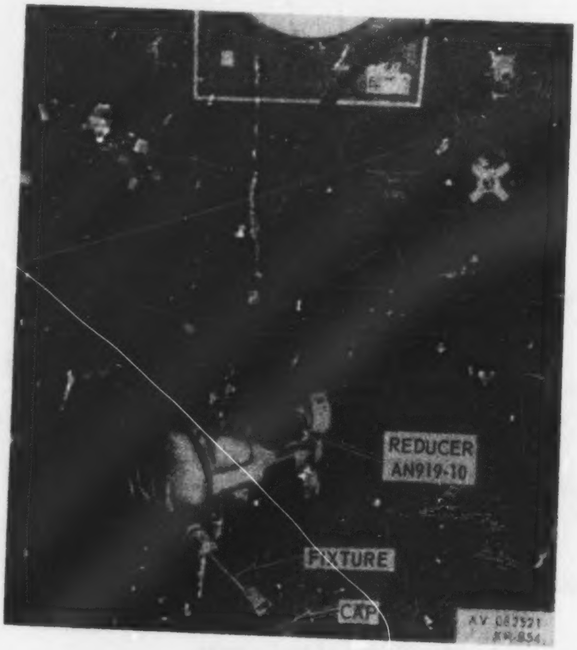


Figure 8-19. Fuel Heater Pressure Test Connections

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(10) Remove reducer from FUEL IN port and cap from fixture at FUEL OUT port.

b. Oil Circuit Pressure Test. (See figure 8-19.)

(1) Install reducers, AN919-10, in OIL IN and OIL OUT ports.

(2) Connect a No. 4 (1/4 inch diameter) hose from reducer at OIL IN port of fuel heater to STATIC PRESSURE PORT OIL port of test stand.

(3) Using oil hand pump on left side of test stand, supply test oil to fuel heater oil chamber until oil begins to discharge from OIL OUT port.

(4) Using suitable cap, cap off OIL OUT port.

(5) Ensure that fuel side of fuel heater is open to vent.

(6) Using oil hand pump on left side of test stand, build up pressure in heater oil chamber, at a rate of 100 psi per minute, until STATIC PRESSURE OIL gage indicates 300 psi.

(7) Maintain applied pressure for 5 minutes. After 5 minutes elapsed time, fuel heater shall show no evidence of failure, malfunction, distortion, or unsatisfactory leakage.

(8) Reduce pressure to zero; then remove hose from fuel heater.

(9) Remove reducers from OIL IN and OIL OUT ports.

c. Flow Test. (See figure 8-20.)

(1) Install reducer (19) in FUEL IN port.

(2) Install reducer (9 and 10) in OIL IN and OIL OUT ports.

(3) Connect hose (5) to RETURN PORT OIL port on test stand; then install reducer (16) to opposite end of hose.

(4) Connect hose (18) to reducer; then connect adapter (11) to opposite end of hose. Connect adapter to OIL OUT port of fuel heater.

(5) Connect hose (14) from oil-out adapter to OUTLET PRESSURE port on test stand. Connect thermocouple plug (12) to adapter receptacle.

(6) Connect hose (3) to PRESSURE PORT OIL port of test stand; then install reducer (1) to opposite end of hose.

(7) Connect hose (4) to reducer; then install union (13) to opposite end of hose.

(8) Connect adapter (8) to union; then connect adapter to OIL IN port of fuel heater.

(9) Connect hose (6) to adapter in OIL IN por then install tee (17) in opposite end of hose. Conne tube (2) from one leg of tee to INLET PRESSURE port of test stand, and tube (15) from remaining le of tube to GAUGE PORT 67 (outlet pressure). Connect No. 3 thermocouple plug (7) to adapter receptacle.

(10) Connect hose (22) to RETURN PORT FUEL port of test stand; then install reducer (28) to opposite end of hose.

(11) Connect hose (33) to reducer; then ins reducer (39) in opposite end of hose.

(12) Connect adapter (38) to reducer in ho and connect adapter to FUEL OUT port of heater.

(13) Connect hose (37) to adapter pressure port; then install tee (34) in opposite end of hose. Connect tube (26) from tee to OUTLET PRESSU port on test stand. Connect hose (30) from rema ing leg of tee to low pressure port on water gage (range 0-10). Connect No. 1 thermocouple plug to adapter receptacle.

(14) Connect hose (27) to PRESSURE FU PORT port of test stand; then install reducer (to opposite end of hose.

(15) Connect hose (32) to reducer; then reducer (40) in opposite end of hose.

(16) Install reducer (19) in FUEL IN port heater. Connect adapter (20) to reducer.

(17) Connect hose (23) to adapter pressure port; then install tee (35) to opposite end of hose.

(18) Connect flexible hose (25) from tee GAUGE PORT FUEL 22 of test stand. Connect inch diameter adapter from remaining tee; then stall another tee, AN824-4, in adapter. Connect hose (24) from leg of tee to GAUGE PORT 25 of stand. Connect a No. 4 (1/4 inch diameter) hose from remaining leg of tee to high-pressure port water gage (range 0-10) (29). Connect No. 2 ther mocouple plug (21) to adapter receptacle.

d. Fuel Circuit Check.

(1) Press STAND POWER ON and FUEL ON buttons.

(2) Set TEMPERATURE CONTROL FUEL to obtain a fuel inlet temperature of 63 to 75°F to 24°C).

(3) Turn BYPASS FUEL and BACK PRE CONTROL-FUEL valves until FLOWMETER F gage indicates 380 to 420 phr, and Δ P FUEL HEAT EX. gage indicates 10 to 15 psi.

(4) Maximum permissible differential pre as indicated on water gage shall be 1.19 inches

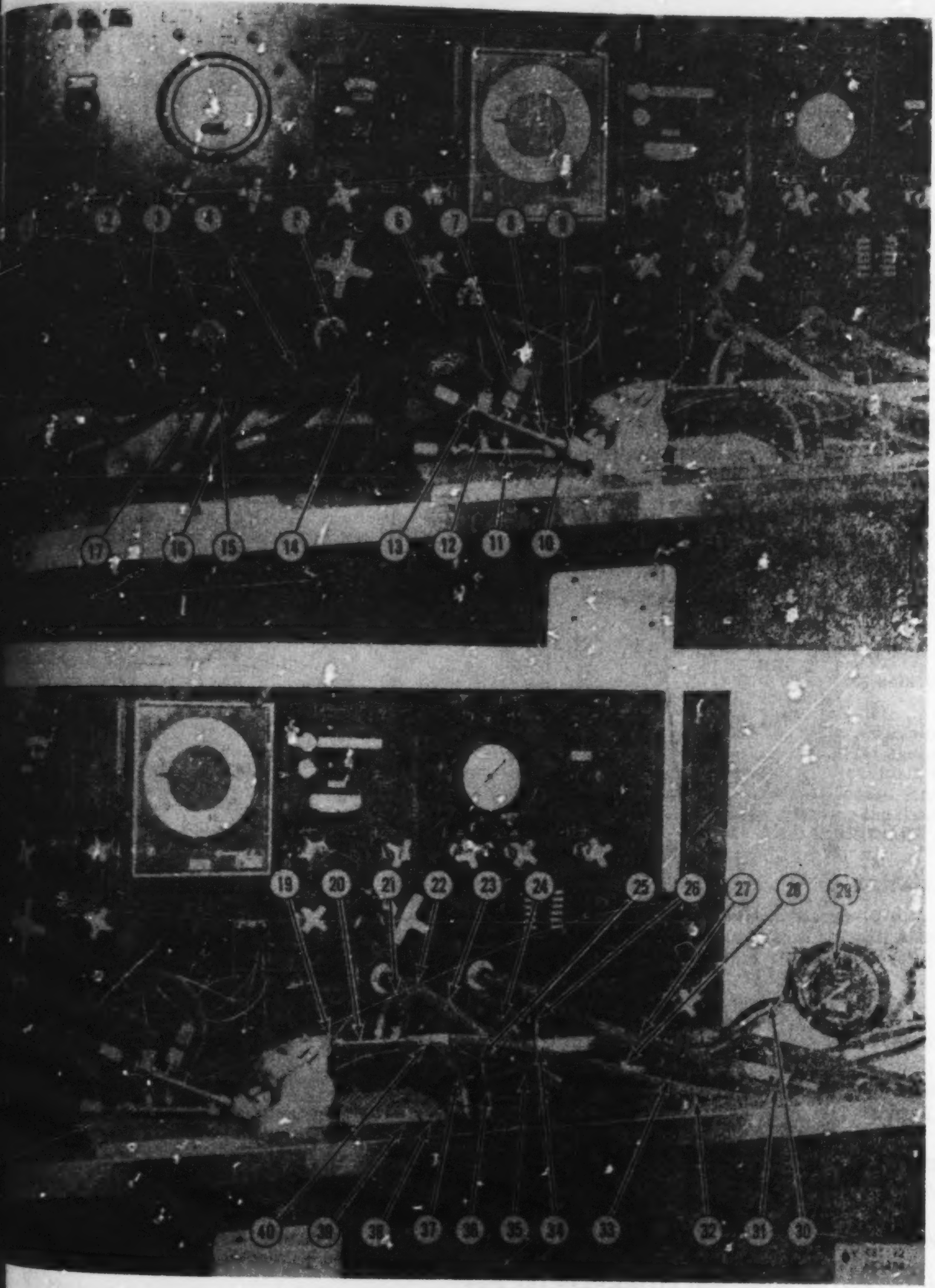
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Figure 8-20. Fuel Heater Flow Test Connections

Key to Figure 8-20.

1. Reducer (AN919-18)
2. Tube (1/4 inch diameter)
3. No. 12 Hose (3/4 inch diameter)
4. No. 6 Hose (3/8 inch diameter)
5. No. 12 Hose (3/4 inch diameter)
6. No. 4 Hose (1/4 inch diameter)
7. No. 3 Thermocouple Plug
8. Adapter (3/8 inch diameter)
9. Reducer (AN919-12)
10. Reducer (AN919-12)
11. Adapter (3/8 inch diameter)
12. No. 4 Thermocouple Plug
13. Union (AN815-6)
14. No. 4 Hose (1/4 inch diameter)
15. Tube (1/4 inch diameter)
16. Reducer (AN919-18)
17. Tee (AN824-4)
18. No. 6 Hose (3/8 inch diameter)
19. Reducer (AN919-11)
20. Adapter (1/4 inch diameter)
21. No. 2 Thermocouple Plug
22. No. 12 Hose (3/4 inch diameter)
23. No. 4 Hose (1/4 inch diameter)
24. No. 4 Hose (1/4 inch diameter)
25. Flexible Hose (1/4 inch diameter)
26. Tube (1/4 inch diameter)
27. No. 12 Hose (3/4 inch diameter)
28. Reducer (AN919-18)
29. Water Gage
30. No. 4 Hose (1/4 inch diam
31. Reducer (AN919-18)
32. No. 6 Hose (3/8 inch diamet
33. No. 6 Hose (3/8 inch diamet
34. Tee (AN824-4)
35. Tee (AN824-4)
36. No. 1 Thermocouple Plug
37. No. 4 Hose (1/4 inch diame
38. Adapter (1/4 inch diamete
39. Reducer (AN919-6)
40. Reducer (AN919-7)

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(5) Turn BYPASS FUEL and BACK PRESSURE CONTROL-FUEL valves until FLOWMETER FUEL gage indicates 780 to 840 phr, and Δ P FUEL SIDE HEAT EX. gage indicates 10 to 15 psi.

(6) Maximum permissible differential pressure, as indicated on water gage, shall be 4.6 inches water.

e. Valve Stabilization Test.

(1) Turn TEMPERATURE CONTROL OIL knob to obtain 245 to 255°F (118 to 124°C) on TEMPERATURE CONTROL OIL temperature readout. Observe that oil reaches operating temperature.

(2) Turn BYPASS OIL and BACK PRESSURE CONTROL OIL valves until FLOWMETER OIL indicates 2550 to 2650 phr.

(3) Adjust fuel flow to obtain 800 phr, plus or minus 50, at 70°F, plus or minus 10° (21°C plus or minus 11°) and at a pressure of 10 to 15 psi. After a stabilization period of 4 to 6 minutes, the difference between fuel inlet and fuel outlet temperatures shall not exceed 5°F. Read temperatures on TEMPERATURE INDICATOR gage.

(4) Observe black needle on Δ P OIL SIDE HEAT EX. gage, and record indication.

(5) Subtract red needle reading on Δ P OIL SIDE HEAT EX. gage from black needle reading. Differential pressure shall be within 3.4 to 3.8 psi.

f. Oil Circuit Check.

(1) Reverse lines to FUEL IN and FUEL OUT ports of heater.

(2) Bring inlet temperature of fuel down to 30°F (-1°C) and inlet oil temperature to 75 to 85°F (24 to 29°C).

(3) Turn BYPASS FUEL and BACK PRESSURE CONTROL-FUEL valves until FLOWMETER FUEL gage indicates 380 to 420 phr.

(4) Check Δ P FUEL SIDE HEAT EX. gage for pressure of 10 to 15 psi.

(5) Turn BYPASS OIL and BACK PRESSURE CONTROL-OIL valves until FLOWMETER OIL gage indicates 1750 to 1850 phr.

(6) Check OIL SIDE HEAT EX. gage for an inlet pressure of 60 psi or below.

(7) Check Δ P gage, and subtract black ne reading from the red needle reading. Differentia pressure shall not exceed 3.8 psi.

g. If test requirements cannot be met, replac fuel heater assembly.

8-42. FUNCTIONAL TESTING OF MAIN FUEL MANIFOLD ASSEMBLY (T53-L-7/7A Engines). Perform following tests, using calibrating fluid 11, table 2-2) heated to 60 to 120°F.

a. Tighten all injectors in main fuel manifol 115 to 125 pound-inches torque.

b. Install fuel dividers, with exit orifices op to 0.052 to 0.058 inch diameter, into assembly adapter (LTCT887). Screw test adapters into m fold connectors, and tighten securely.

c. Position main fuel manifold on manifold t unit of test stand (LTCT314), and the fuel line c nector at fuel drain tube No. 7. (See figure 8-2

NOTE

Hose lengths shall be as short as practicable.

d. Connect a No. 6 (3/8 inch diameter) hos OUTLET NO. 4 HIGH PRESSURE port of test s to manifold connector located at drain tube No.

e. Set INJECTOR TIMING control to 12.4

f. Set METERING TUBE DRAIN switch to CLOSED position. Check to see that all tubes zero.

g. Press POWER SWITCH, BOOSTER PU button. Wait approximately 15 seconds, and MAIN PUMP ON button.

h. Open PRESSURE CONTROL valve. Pou GAGE NO. 4 HIGH PRESSURE gage should beg

i. Using BYPASS valve control, adjust pre til GAGE NO. 4 HIGH PRESSURE gage indicates 205 psi.

j. Visually inspect manifolds for evidence leakage at injector seals. If small amount of is detected, tighten adapter in manifold. If lea cannot be stopped, reject main fuel manifold.

3/8 INCH DIAMETER HOSE
FROM "OUTLET NO. 4
HIGH PRESSURE" PORT
FUEL DRAIN PORT
NO.
AV 002502
NR 898

Figure 8-21. Manifold Installed in Test Unit (T53-L-7/7A)

k. Press TIMER ON button to shift manifold mounting plate so injectors discharge into metering tube for preset time limit.

l. When the timer completes its cycle, press MAIN PUMP OFF button.

m. Close PRESSURE CONTROL valve, and observe that pressure indicated on GAGE NO. 4 HIGH PRESSURE gage drops to zero.

NOTE

In following step n., injectors providing normal flow are not to be interchanged.

n. Observe that fluid level in the 11 METERING TUBE BANK indicating tubes is within the 58 to 66 cc marks on tubes. If levels are out of limits, interchange the low, or lowest, flow injector with the high-flow injectors; then repeat steps e. through m. If fluid levels remain out of limits, replace defective injectors. Tighten injectors to 115 to 125 pound-inches torque.

o. Set METERING TUBE DRAIN switch to OPEN position to drain fluid in the indicating tubes, and press MAIN PUMP OFF button. Allow sufficient time for all tubes to drain to zero cc.

p. Disconnect hose, installed in step d., from manifold and remove main fuel manifold from testing unit.

q. Remove adapters from manifold connectors.

r. Install plugs (LTCT406) in connectors. (See figure 8-22.)

NOTE

In following step s., hose length shall be as short as practicable.

s. Connect main fuel manifold to a No. 4 (1 inch diameter) hose; then connect hose to OUTL NO. 3 STATIC PRESSURE port of test stand.

t. Turn STATIC BYPASS valve clockwise to

u. Using hand pump on test stand, increase sure until GAGE NO. 1 STATIC PRESSURE ga dicates 800 to 850 psi. Maintain this pressure minimum of 2 minutes, and check for leakage brazed joints and manifolds.

v. Reject main fuel manifolds if flow and/o pressure requirements cannot be met.

w. Turn STATIC BYPASS valve countercloc to decrease pressure to zero.

x. Disconnect hose from main fuel manifol OUTLET NO. 3 STATIC PRESSURE port of te stand. Remove main fuel manifold from test

8-43. FUNCTIONAL TESTING OF MAIN FU MANIFOLD ASSEMBLY (T53-L-15/701 Engin Perform following test, using calibrating fluid table 2-2) heated to 79 to 82°F. (Refer to figure

a. Tighten nozzles to 50 to 75 pound-inche and mount fuel manifold half in modification 3041) or suitable flow fixture on test stand (L

b. Connect pressure hose from test stand primary port No. 1.

1/4 INCH DIAMETER HOSE TO "OUTLET NO. 3 STATIC PRESSURE" PORT

22. Manifold Pressure Test Setup (T53-L-7, 7A

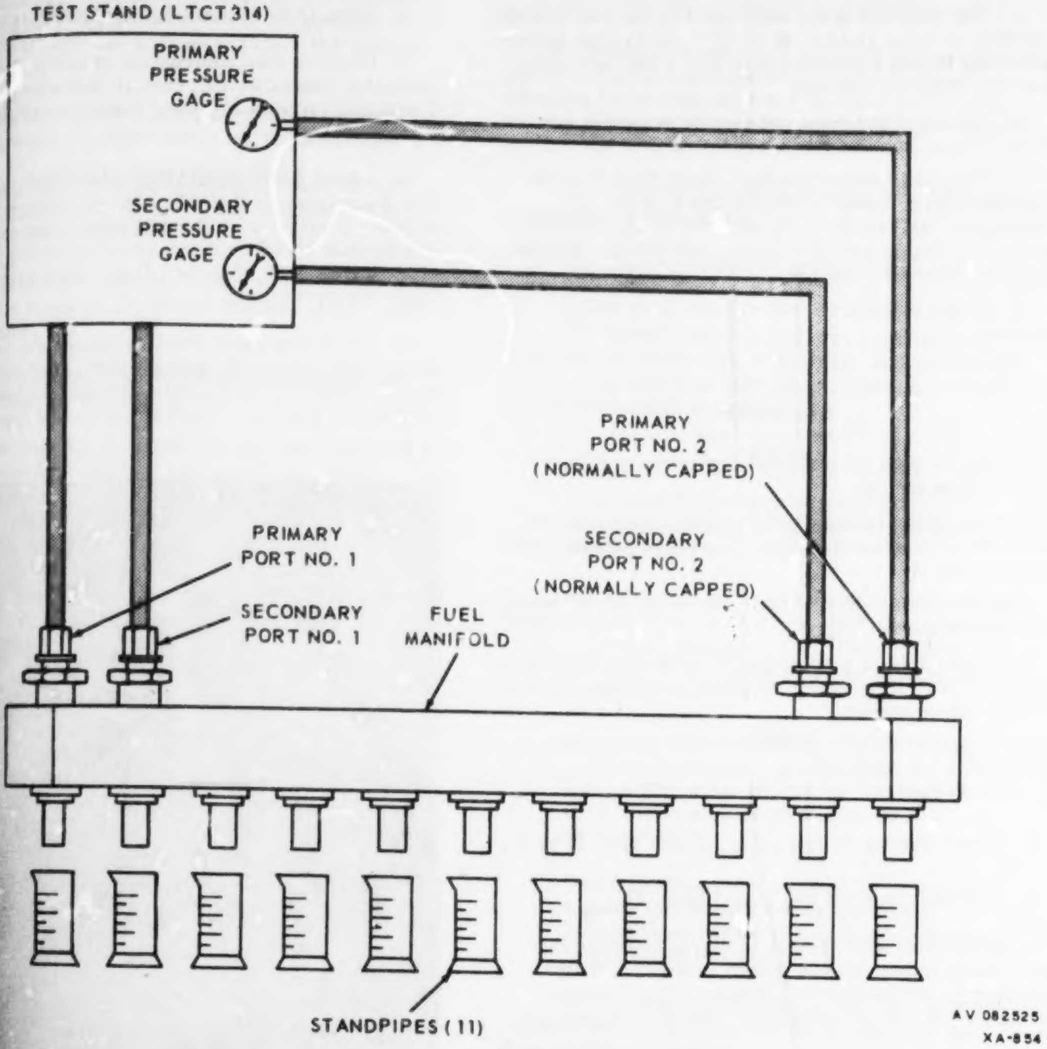

TEST STAND (LTCT 314)
PRIMARY PRESSURE GAGE
SECONDARY PRESSURE GAGE
PRIMARY PORT NO. 2 (NORMALLY CAPPED)
SECONDARY PORT NO. 2 (NORMALLY CAPPED)
PRIMARY PORT NO. 1
SECONDARY PORT NO. 1
FUEL MANIFOLD
STANDPIPES (11)
AV 082525
XA-854

Figure 8-23. Functional Test Schematic - Fuel Manifold (Complete) Assembly (T53-L-15/701)

Connect pressure gage hose from test stand to ry port No. 2.

Flow at 585 to 615 psig to primary port No. 1 ld pressure for one minute. With secondary disconnected, blow filtered shop air through ry system, and observe for any indication of from primary into secondary. No external is allowed.

Decrease pressure to zero. Connect pressure from test stand to secondary port No. 1 and gage hose from test stand to secondary No. 2.

Flow at 585 to 615 psig to the secondary port and 440 to 460 psig to the primary port No. 1 neously. Hold pressure for a minimum of one Observe for any indication of leakage at the between the nozzle and manifold. No external is allowed.

g. Decrease pressure to zero. Remove pressure gage hose from primary port No. 2 and cap port.

NOTE

Following step h. may be performed in two cycles of 85 seconds.

h. Position test stand shift mechanism and TIMER SWITCH to allow fluid at 99 to 101 psig to flow through primary port No. 1 for 170 seconds.

i. Start timed flow test.

j. When fluid stops flowing, check fluid level in each standpipe. Level of fluid in each of the 11 standpipes shall be 51 to 73 cc. This is an indicated value. To obtain actual volume, add 100 cc. Record fluid level for each nozzle.

k. Emply calibrating fluid from standpipes.

l. Position test stand shift mechanism and TIMER SWITCH to allow fluid at 99 to 101 psig to flow simultaneously through primary port No. 1 and secondary port No. 1 for 40 seconds.

m. Empty standpipes and reposition under each of the 11 fuel nozzles and start timed flow test.

n. When fluid stops flowing, check fluid level in each standpipe. Level of fluid in each of the 11 standpipes shall be 60 to 76 cc. This is an indicated value. To obtain actual volume, add 100 cc. Record fluid level for each nozzle.

o. Empty standpipes and remove from under nozzles.

CAUTION

Cap or plug all openings and ports in following step p.

p. Decrease pressure to zero. Disconnect and remove all test hoses and fittings from fuel manifold (complete) assembly.

q. If fuel manifold half fails any of the above tests, return to Depot for repair.

r. If manifold is a spare part, immediately package and install in reusable shipping container, P/N P-1393, or equivalent.

8-44. ASSEMBLY OF COMBUSTION CHAMBER DRAIN VALVE ASSEMBLY. (See figure 6-32.) Proceed as follows:

a. Insert spring (2) and plate (1) into body (3 or 5).

b. Depress plate (1) and insert pins (4).

c. Stake pins (4) to retain in place. Ensure that staked ends of pins do not extend more than 0.020 inch beyond circumference of body. If necessary, file corner of pins to maintain 0.020 inch dimension.

8-45. FUNCTIONAL TESTING OF COMBUSTION CHAMBER DRAIN VALVE ASSEMBLY. Using calibrating fluid (item 11, table 2-2), heated to 60 to 120°F, perform the following test:

a. Install combustion chamber drain valve assembly in test fixture (LTCT859). (See figure 8-24.)

b. Connect a No. 4 (1/4 inch diameter) hose from OUTLET NO. 2 LOW PRESSURE port of test stand (LTCT314) to connector on fixture.

NOTE

In following step c., hose length shall be as short as practicable.

The combustion chamber drain valve assembly is normally open; therefore, under a nonpressure condition and depending upon spring tension, valve will remain open from 0 to 0.6 psi.

c. Open LOW PRESSURE SHUTOFF valve.

d. Observe that combustion chamber drain valv assembly closes at differential pressure of 0.6 to 3 psi, and reopens at 3 psig maximum on decreasing pressure.

e. Adjust LOW PRESSURE SHUTOFF valve to tain a pressure of 9 to 11 psig. If leakage is observed, position a calibrated measuring cup at combustion chamber drain valve assembly port and allow combustion chamber drain valve assembly to drain for one minute.

f. Check that fluid level in measuring cup does not exceed 10 cc. If leakage rate is out of limits, lap or polish the valve and valve seat to remove an scratches, pits, etc. which may be the cause of

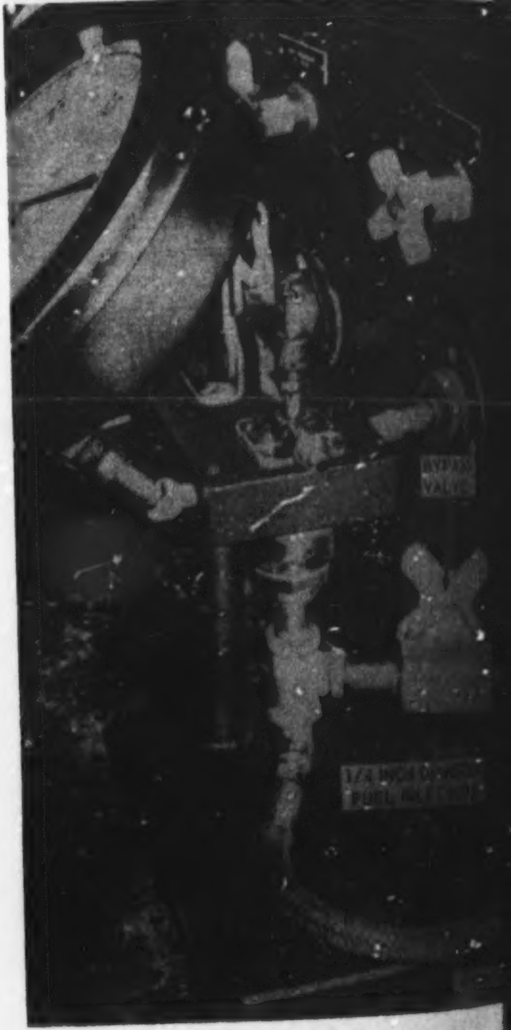


Figure 8-24. Combustion Chamber Drain Valve Assembly Test Setup

sive leakage. The use of either an acceptable ing compound or crocus cloth is acceptable. If ge rate is still out of limits, reject the discre- valve.

Return test stand to pretest conditions and re- e combustion chamber drain valve assembly.

ASSEMBLY OF FLOW DIVIDER AND DUMP VE ASSEMBLY (T53-L-15/701 Engines). (See e 6-31.) Proceed as follows:

Install plunger (20), blind end out, through inlet of lower housing (7). Insert spring (3) into open of plunger.

Install packing (19) on flanged union half (18) stall into lower housing (7).

Install packing (5), seal (6), and seal assembly (if removed) on flanged union half (2). Rest d union half (18) on flat surface and hold lower g (7) while compressing spring (3) with flanged half (2). Align holes in flanged union halves 18) and lower housing (7), and secure unions ing with screws (1). Tighten screws as re- d.

Install packing (8) on lower housing (7).

Install packing (9) on upper housing (10) and upper housing on lower housing (7).

Install plunger (11), blind end in, into upper g (10). Position shim (12) into bottom of r and insert spring (13) into open end of r.

Install packing (14) on spring retainer cap (15) ition cap, stepped end, on spring.

Compress spring with cap until top of cap is ith surface of upper housing. Place cover (16) on upper housing (10) in same position which it was removed, and secure with screws ighten screws as required. (Refer to table eference number 113.) Lockwire screws.

FUNCTIONAL TESTING OF FLOW DIVIDER UMP VALVE ASSEMBLY (T53-L-15/701 En- Perform the following test, using calibrating 11, table 2-2) heated to 70 to 90° F.

stall flow divider and dump valve assembly stand (LTCT314).

stall caps on outlet ports and drain port.

pply pressure of 1500 ± 100 psig to inlet port divider and dump valve assembly. Maintain re for 2 minutes.

While pressure is being applied, inspect flow r and dump valve assembly for evidence of e and distortion. No leakage or distortion is d. Decrease pressure to zero.

e. Remove caps installed in preceding step b.

eA. Remove plugs from primary and secondary ports of flow divider and dump valve assembly. Prepare valve assembly for the flow scheduling versus pressure drop test as follows: (See figure 8-24A.)

(1) Connect fuel inlet hose to 0 to 1000 phr rotometer on test stand.

(2) Connect hoses to primary and secondary ports of valve.

(3) Install nozzle simulators (adjustable orifices) in outlet ends of primary and secondary hoses. Connect 0 to 1000 phr rotometer to outlet of secondary nozzle simulator.

NOTE

Fuel inlet temperature, when setting simulator in following step (4), shall be 65 to 75° F.

(4) Set primary and secondary nozzle simulators for an inlet pressure of 100 psig. Adjust primary nozzle simulator for flow of 123 to 127 phr, and secondary nozzle simulator for a flow of 415 to 425 phr.

NOTE

Decreasing shim thickness will increase flow, increasing shim thickness will decrease flow.

The following point in step (5) is merely a guide and should not be cause for rejection on reflow if flow requirements in table 8-1 are met.

(5) Increase total flow to 400 phr, and add or remove shim (12, figure 6-31) to obtain a secondary flow of 250 to 270 phr.

f. Apply pressure of 50 psig to inlet port. Slowly decrease this pressure and observe flow divider and dump valve assembly for fluid flow from drain port. Fluid shall start to flow from drain port at 22 to 32 psig. Decrease pressure to zero.

g. Disconnect hoses from secondary ports of valve.

h. Gradually increase the flow from 0 to 50 phr. Leakage shall not exceed 10 cc per minute.

i. (Deleted)

j. Reconnect hoses from secondary ports of valve.

k. (Deleted)

l. Perform flow test of flow divider and dump valve assembly, using values given in table 8-1.

m. After completion of tests noted in preceding step j., decrease pressure to zero.

n. Place beaker under flow divider and dump valve assembly at drain port. Apply 50 psig pressure to inlet port and increase to 370 to 430 psig. Leakage at drain connection shall not exceed 0.5 cc per minute at either pressure. Decrease hydraulic pressure to zero.

o. Remove flow divider and dump valve assembl from fixture.

p. If valve assembly fails to pass tests in steps h. and n., replace packing (5, figure 6-31) and se (6) and/or plunger (20), and retest.

q. Reject flow divider and dump valve assembly assembly does not pass preceding tests.

8-48. ASSEMBLY OF STARTING FUEL NOZZLE ASSEMBLY (T53-L-7/7A Engines). (See figure 6-30.) Proceed as follows:

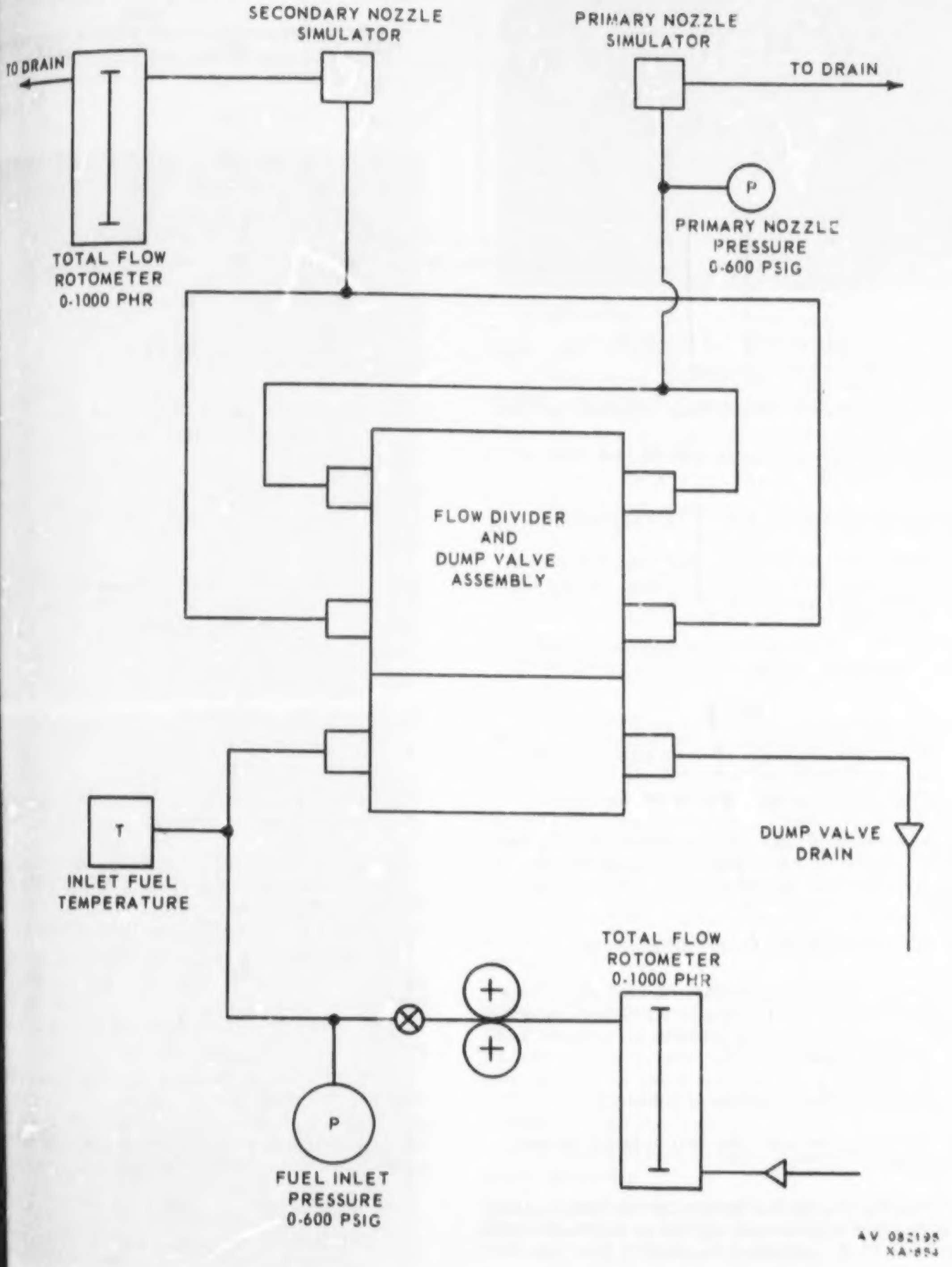

SECONDARY NOZZLE SIMULATOR
PRIMARY NOZZLE SIMULATOR
TO DRAIN
TO DRAIN
TOTAL FLOW ROTOMETER 0-1000 PHR
P
PRIMARY NOZZLE PRESSURE 0-600 PSIG
FLOW DIVIDER AND DUMP VALVE ASSEMBLY
T
INLET FUEL TEMPERATURE
DUMP VALVE DRAIN
TOTAL FLOW ROTOMETER 0-1000 PHR
P
FUEL INLET PRESSURE 0-600 PSIG
AV 082195
XA-894

Figure 8-24A. Flow Divider and Dump Valve Assembly Schematic for Test Setup (T53-L-15/701)

Table 8-1. Flow Divider Test Values

TOTAL FLOW PHR	VALVE INLET PRESS. PSIG		SECONDARY FLOW PSIG	
	MIN	MAX	MIN	MAX
100	54	80	0	8
*300	160	190	140	175
500	175	205	335	375
*700	207	247	518	578
900	290	362	695	745
Note: For test points marked with an asterisk, data will also be recorded in the decreasing flow direction.				

a. Insert guide (3) into end of strainer (2). Insert guide and strainer into retainer (1).

b. Insert strainer (7) into body subassembly (13).

c. Slide strainer (11) into seat (9) and slide spring (10) over strainer.

d. Insert distributor (12) into subassembly.

e. Insert assembled seat, strainer, and spring into nozzle body subassembly (13) and, using suitable tool, guide parts into place.

f. Insert seal (8) into body subassembly and ensure that it is properly seated.

NOTE

> In following step g., to ensure that strainer is not crushed, observe strainer through purge holes of body subassembly.

g. Insert seat (6) into body subassembly with five holes of seat facing away from body subassembly. Using suitable tool, depress seat to ensure proper seating.

h. Insert seal (5) into body subassembly.

i. Insert ball (4) into position on seat (6). Place body subassembly into collet and screw assembled retainer (1), guide (3), and strainer (2) by hand into place in order to center ball.

j. Remove retainer, guide and strainer.

k. Using suitable tool, tap ball in order to seat ball properly.

l. Install assembled retainer, guide, and strainer into body subassembly, and tighten as required. (Refer to table 11-3, reference number 71.)

m. Functional-test starting fuel nozzle assembly. (Refer to paragraph 8-49.)

NOTE

> In step n. below, to prevent overheating, use a heat sink or wrap a wet cloth around body subassembly.

n. Using welding wire (item 121, table 2-2), t weld retainer to body assembly in two places, 1 degrees apart. Tack welds shall be 3/32 to 1/8 in diameter.

8-49. FUNCTIONAL TESTING OF STARTING F NOZZLE ASSEMBLY (T53-L-7/7A Engines). P form the following test, using calibrating fluid, (item 11, table 2-2), heated to 60 to 120°F.

a. Shake starting fuel nozzle assembly to e freedom of ball movement.

NOTE

> In following step b., hose length shall be as short as practicable.

b. Connect No. 4 (1/4 inch diameter) hose, w 1/8 inch diameter adapter, from FUEL OUTLET NOZZLE port of test stand (LTCT314). Connect adapter of hose to starting fuel nozzle assembly.

c. Turn FUEL BYPASS VALVE knob until INL PRESS. TO NOZZLE gage indicates 5 to 100 psi With nozzle in horizontal position, check that le through four purge holes does not exceed 20 drop per minute.

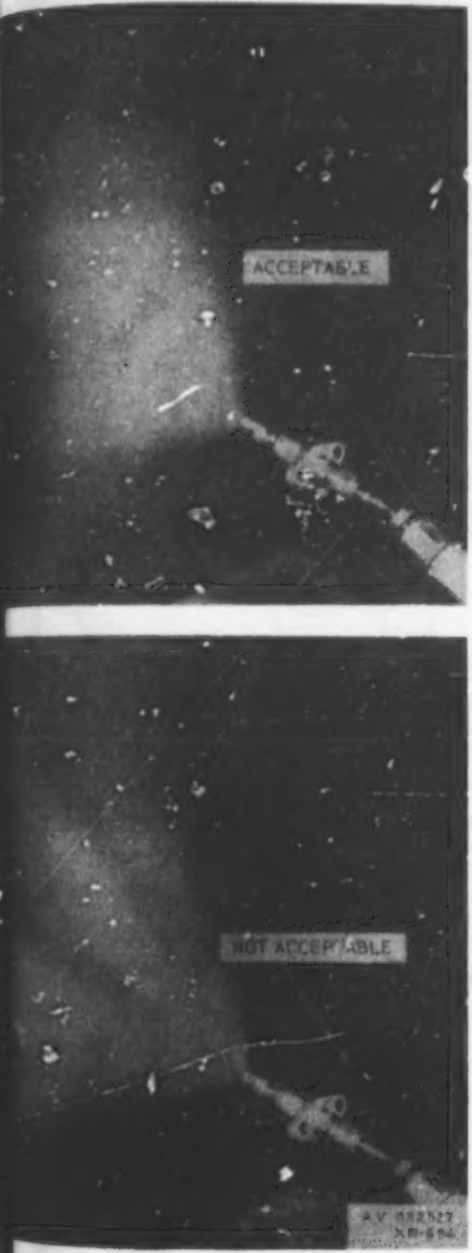
d. Turn FUEL BYPASS VALVE knob until INL PRESS. TO NOZZLE gage indicates that press of 100 to 450 psi has been obtained. With nozzle horizontal position, check that leakage through fo purge holes does not exceed 40 drops per minute.

NOTE

> In following step e., spray cone from new starting fuel nozzle assemblies shall be hollow, uniform, and free from streaks. Spray cone from used starting fuel nozzle assemblies shall be hollow, well atomized, and free of void sections; slight streaks are permitted.

. Turn FUEL BYPASS VALVE knob until INLET
. TO NOZZLE gage indicates 15 to 16 psig.
k starting fuel nozzle assembly spray cone. (See
re 8-25.)

. Position starting fuel nozzle assembly just
and close to test set protractor. Check that
y cone assembly is 70 degrees minimum. (See
re 8-26.



re 8-25. Starting Fuel Nozzle Assembly Spray Cone (T53-L-7/7A)

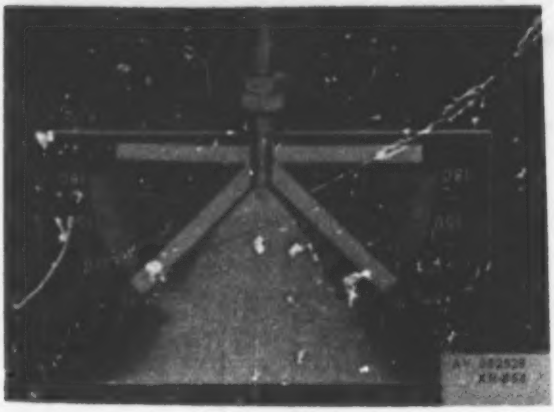


Figure 8-26. Starting Fuel Nozzle Assembly Spray Angle (T53-L-7/7A)

g. Turn FUEL BYPASS valve knob until INLET PRESS. TO NOZZLE gage indicates 30 to 31 psi.

h. Position starting fuel nozzle assembly just above and close to test set protractor. Check that spray cone angle is 90 to 100 degrees.

i. Turn FUEL BYPASS VALVE knob until INLET PRESS. TO NOZZLE gage indicates 100 to 105 psi.

j. Repeat preceding step h.

k. Insert starting fuel nozzle assembly in test chamber (LTCT873) and secure with integrated clamp.

l. Pull FUEL SHUTOFF TO NOZZLE lever on test stand.

m. Turn FUEL BYPASS VALVE knob until INLET PRESS. TO NOZZLE gage indicates that fuel pressure of 100 to 105 psi has been obtained.

n. Position graduated beaker under No. 1 fixture drain tube. (See figure 8-27.) Allow fuel to drain into beaker for one minute. Hot-streak flow shall be 88 to 149 cc per minute.

o. Position graduated beaker under No. 2 fixture drain tube. Allow fuel to drain into beaker for one minute. Spray cone flow shall be 83 to 109 cc per minute.

p. Turn FUEL BYPASS VALVE knob until INLET PRESS. TO NOZZLE gage indicates 70 to 75 psig. Check that fuel quantity of hot streak passing through 1/4 inch diameter target, 4 inches away from starting fuel nozzle assembly (No. 2 drain tube), is at least 50 percent greater than fuel quantity not passing through the target.

q. If limits cannot be met, reject starting fuel nozzle assembly.

8-50. FUNCTIONAL TESTING OF STARTING FUEL NOZZLES (T53-L-15/701 Engines). (See figures 8-28 and 8-29.) Proceed as follows.

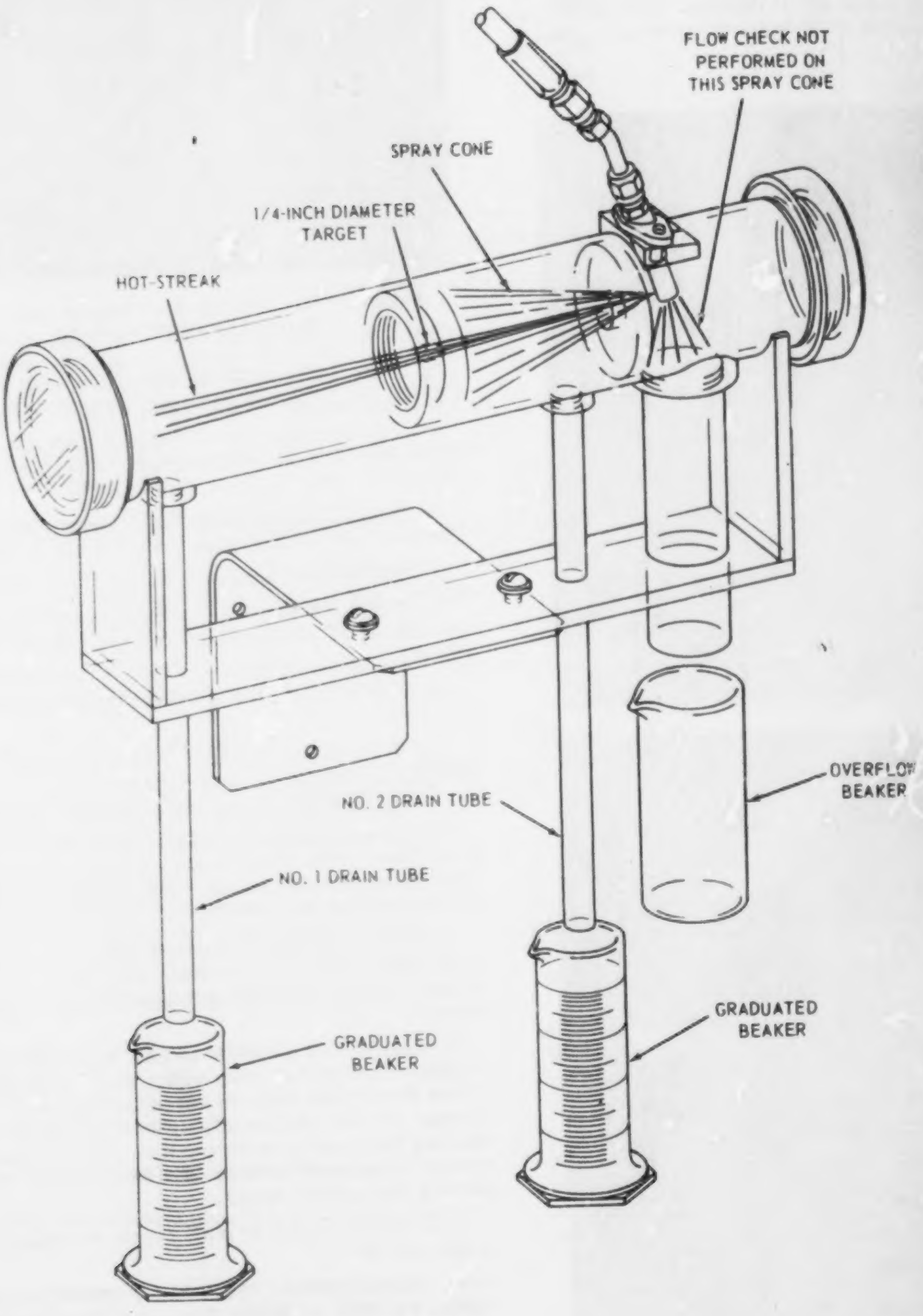

FLOW CHECK NOT
PERFORMED ON
THIS SPRAY CONE
SPRAY CONE
1/4-INCH DIAMETER
TARGET
HOT-STREAK
OVERFLOW
BEAKER
NO. 2 DRAIN TUBE
NO. 1 DRAIN TUBE
GRADUATED
BEAKER
GRADUATED
BEAKER
AV 062829
X-834

Figure 8-27. Flow Testing Starting Fuel Nozzle Assembly (T53-L-7/7A)

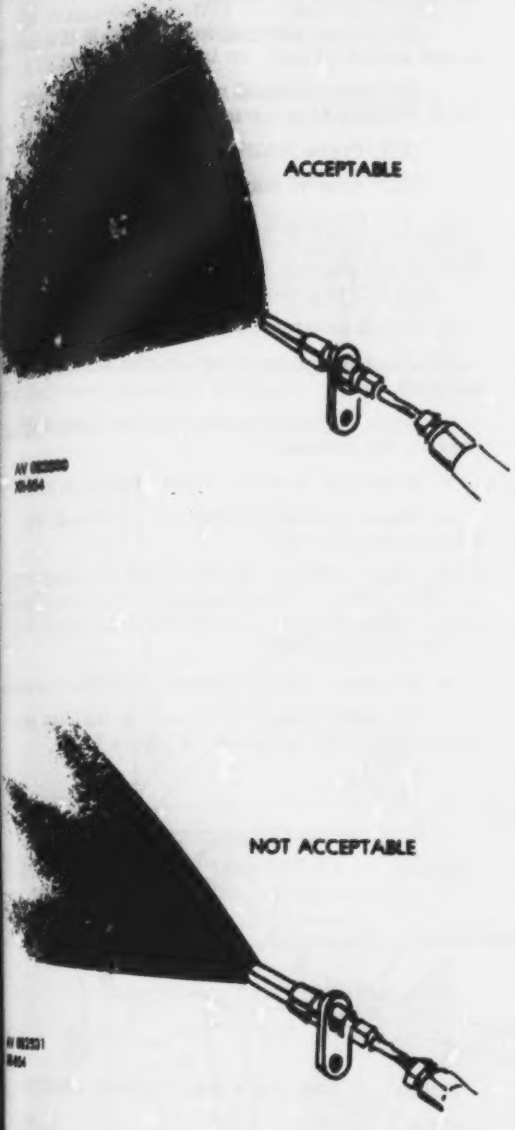


Figure 8-28. Starting Fuel Nozzle Assembly Spray Cone (T53-L-15/701)

NOTE

> Perform the following test, using calibrating fluid (item 11, table 2-2) heated to 78 to 82°F. This test applies to starting fuel nozzle 1-300-349-02 only.

a. Connect a 1/4-inch diameter hose with a 1/8 ch diameter adapter, from FUEL OUTLET TO ZZLE port of test stand (LTCT314 or equivalent); ect adapter of hose to starting fuel nozzle.

aA. Leak-test starting fuel nozzle by applying fluid at 500 psi for a period of one minute. Any evidence of leakage shall be cause for rejection.

b. Turn FUEL BYPASS VALVE knob until INLET PRESS. TO NOZZLE gage indicates 99 to 101 psig.

NOTE

> In following step c., spray cone from new starting fuel nozzle assemblies shall be well atomized, hollow, uniform, and free from streaks. Spray cone from used starting fuel nozzle assemblies shall be well atomized, hollow, and free of void sections. Slight streaks are permitted.

c. Spray cone angle shall cover a spray area of 75 to 85 degrees. Shut down test stand.

d. Insert starting fuel nozzle assembly in suitable fixture.

e. Pull FUEL SHUTOFF TO NOZZLE lever on test stand.

f. Turn FUEL BYPASS VALVE knob until INLET PRESS. TO NOZZLE indicates a fuel pressure of 99 to 101 psig has been obtained.

g. Spray cone flow shall be 5.40 to 6.60 phr.

h. If limits cannot be met, reject starting fuel nozzle.

8-51. FUNCTIONAL TESTING OF STARTING FUEL MANIFOLD (T53-L-7/7A Engines).

Proceed as follows:

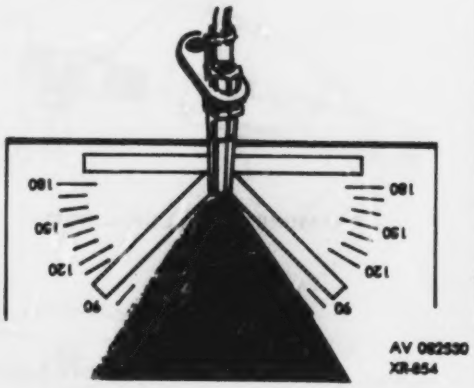
a. Starting fuel manifolds pressure test.

NOTE

> Use a hand pump on test stand (LTCT314) and calibrating fluid (item 11, table 2-2), pressure-test starting fuel manifold.

(1) Install plugs, AN806-3, in manifold connectors.

(2) Connect flexible hose of flow test rig (LTCT899) to OUTLET NO. 3 STATIC PRESSURE port of test stand (LTCT314).



NOTE

In following step (3), primer line (LTCT 900, detail of LTCT899) is not to be installed at this time.

(3) Connect starting fuel manifold to flow test rig (LTCT899).

(4) Close STATIC BYPASS valve.

(5) Using hand pump on test stand, increase pressure until GAGE NO. 1 STATIC PRESSURE gage indicates 800 to 850 psi. Maintain pressure for 50 to 70 seconds, and check for leakage. No leakage should be visible.

(6) If leakage is noted, reject starting fuel manifold.

(7) Decrease pressure to zero.

b. Starting fuel manifolds flow test.

(1) Disconnect flexible hose of flow test rig (LTCT899) from OUTLET NO. 3 STATIC PRESSURE port of test stand, and reconnect to OUTLET NO. 1 HIGH PRESSURE port.

(2) Remove plugs, AN806-3 from manifold connectors, and install primer lines (LTCT900, detail of LTCT899) into ends of starting fuel manifold.

(3) Press MAIN PUMP ON button.

(4) Turn PRESSURE CONTROL knob until GAGE NO. 5 THROTTLING VALVE AIR gage indicates 11 to 12 psi.

(5) Turn BYPASS valve until GAGE NO. 4 HIGH PRESSURE gage indicates 95 to 105 psi.

(6) Observe fuel flow on TOTAL FLOW meter. Fuel flow shall be 200 phr minimum.

(7) Check starting fuel manifold for leakage. No leakage shall be visible.

(8) Reject starting fuel manifold if flow requirements cannot be met, or leakage is noted.

(9) Turn BYPASS valve until GAGE NO. 4 HIGH PRESSURE gage indicates zero.

(10) Press MAIN PUMP OFF button.

(11) Remove starting fuel manifold from test rig.

8-52. FUNCTIONAL TESTING OF STARTING FUEL MANIFOLD (T53-L-15/701 Engines). Use a hand pump on test stand (LTCT314) and calibrating fluid (item 11, table 2-2) to pressure-test starting fuel manifold.

a. Install suitable union in end port of manifold half.

b. Using AN plugs, plug the two nozzle ports of manifold half.

c. Apply 800 psig pressure to manifold half and observe for leakage.

d. If leakage is noted, reject manifold half.

e. Repeat preceding steps a. through d. for second manifold half.

8-53. FUNCTIONAL TESTING OF BYPASS FUEL FILTER (T53-L-7/7A Engines). Perform following tests, using calibrating fluid (item 11, table 2-2) heated to 60 to 120°F.

a. Pressure-test the bypass fuel filter as follows:

(1) Install plug, AN814-6, in fuel-out port of bypass fuel filter as shown in figure 8-30.

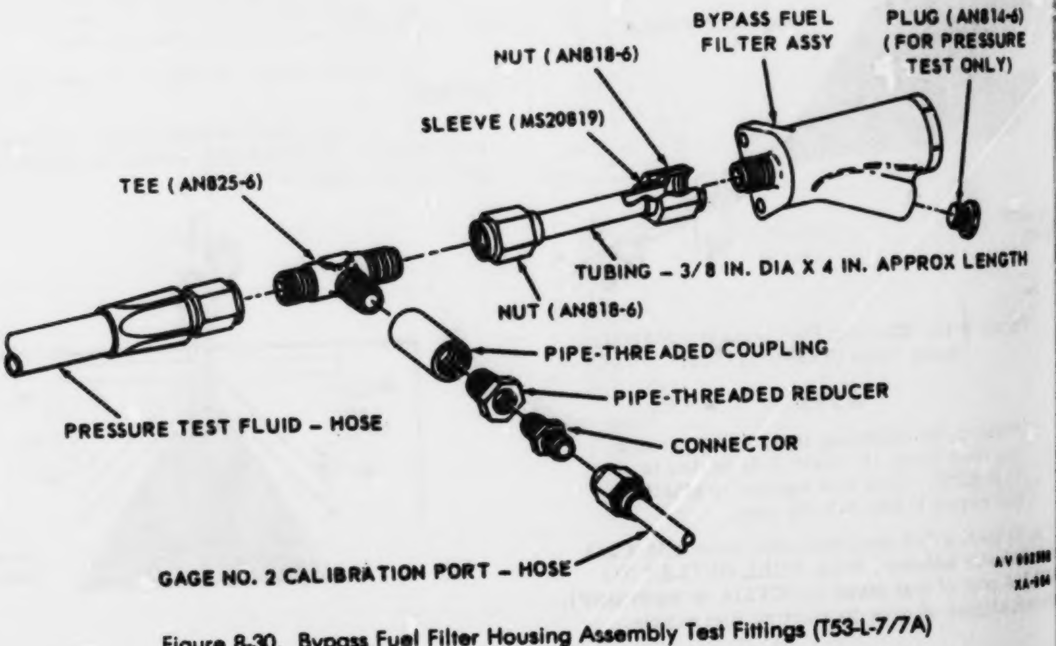

BYPASS FUEL FILTER ASSY
PLUG (AN814-6) (FOR PRESSURE TEST ONLY)
NUT (AN818-6)
SLEEVE (MS20819)
TEE (AN825-6)
TUBING – 3/8 IN. DIA X 4 IN. APPROX LENGTH
NUT (AN818-6)
PIPE-THREADED COUPLING
PIPE-THREADED REDUCER
CONNECTOR
PRESSURE TEST FLUID – HOSE
GAGE NO. 2 CALIBRATION PORT – HOSE

Figure 8-30. Bypass Fuel Filter Housing Assembly Test Fittings (T53-L-7/7A)

NOTE

In following step (2), hose length shall be as short as practicable.

(2) Connect No. 4 (1/4 inch diameter) hose to TLET NO. 3 STATIC PRESSURE port of test nd (LTCT314).

(3) Connect a 3/8 inch diameter adapter to te end of hose; then connect bypass fuel r to adapter.

(4) Turn STATIC BYPASS valve clockwise to e.

(5) Using hand pump on test stand, increase ure until GAGE No. 1 STATIC PRESSURE gage ates 1500 to 1550 psi. Maintain this pressure for to 75 seconds, and observe for leakage. If leakage is ted, reject bypass fuel filter.

(6) Turn STATIC BYPASS valve counterclock- to decrease pressure to zero.

(7) Remove plug installed in preceding step (1).

b. Flow-test the bypass fuel filter as follows:

(1) Connect bypass fuel filter to assembled test fitting attached to a No. 6 (3/8 inch diameter) hose from OUTLET NO. 4 HIGH PRESSURE port of test stand. (See figure 8-30.)

(2) Position bypass fuel filter over drain basin of test stand with opening of the fuel-out facing down. (See figure 8-31.)

(3) Press MAIN PUMP ON button.

(4) Open PRESSURE CONTROL valve until a maximum pressure of 20 psi is indicated on GAGE NO. 2.

(5) Using BYPASS valve control, adjust flow rate until TOTAL FLOW meter indicates 1000 to 1010 phr.

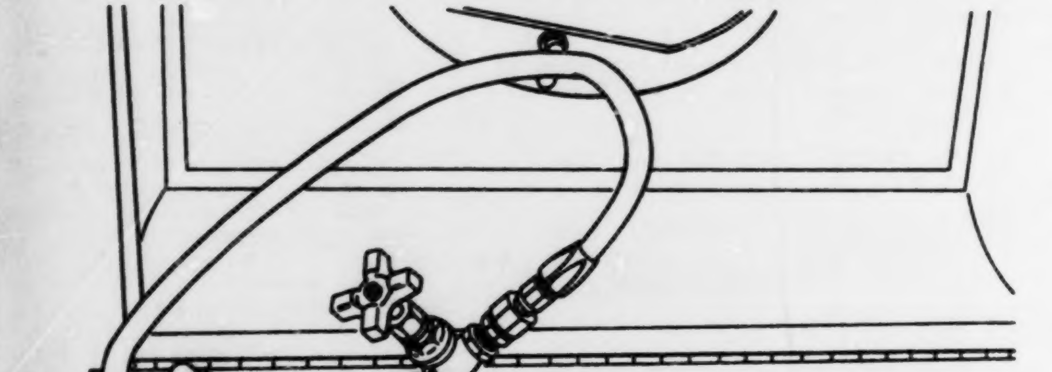


Figure 8-31. Bypass Fuel Filter Installed on Test Unit (T53-L-7/7A)

(6) If flow rate cannot be obtained, reject bypass fuel filter.

(7) Close PRESSURE CONTROL valve.

(8) Open BYPASS valve.

(9) Press MAIN PUMP OFF button.

(10) Remove test fittings from bypass fuel filter.

c. Perform fuel filter bypass test as follows:

(1) Remove filter element from bypass fuel filter assembly.

(2) Inspect teflon coating on interior surfaces of filter housing for chipping or flaking. If chipping or flaking is noted, reject bypass fuel filter assembly. If no chipping or flaking is noted, proceed with testing.

(3) Install a teflon plug into the inlet orifice of filter element.

(4) Install filter element in bypass fuel filter assembly; then attach test fittings that were removed in preceding step b. (10).

(5) Open PRESSURE CONTROL valve. Pointer on GAGE NO. 2 gage should begin to move.

(6) Adjust BYPASS valve until TOTAL FLOW meter indicates 49 to 51 phr. Check that pressure reading on GAGE NO. 2 is between 20 and 35 psi.

(7) Press MAIN PUMP ON button.

(8) Adjust BYPASS valve until TOTAL FLOW meter indicates 790 to 810 phr. Check that pressure reading on GAGE NO. 2 is between 20 and 50 psi.

(9) Open BYPASS valve, close PRESSURE CONTROL valve, and press MAIN PUMP OFF button.

(10) Detach test fittings and disassemble bypass fuel filter assembly. Remove teflon plug from filter element, and reassemble unit. Tighten large plug to 100 to 125 pound-inches torque, and lockwire plug to housing.

(11) Pressure-test bypass fuel filter as outlined in preceding step a.

(12) If bypass fuel filter fails any of these tests, reject filter.

8-54. FUNCTIONAL TESTING OF STARTING FUEL SOLENOID VALVE ASSEMBLY. Proceed as follows:

a. Connect No. 4 (1/4 inch diameter) hose from OUTLET NO. 1 HIGH PRESSURE port on test stand (LTCT314) to inlet port of starting fuel solenoid valve. (See figure 8-32.)

b. Position DC POWER switch to OFF.

c. Connect electrical lead from DC OUTLET re ceptacle to starting fuel solenoid valve receptacle.

d. Position DC POWER switch to ON. Set D. C CONTROL knob until DC VOLTMETER indicates 1 to 30 vdc.

e. Press MAIN PUMP ON switch.

f. Open HIGH PRESSURE CONTROL valve, and observe GAGE NO. 4 HIGH PRESSURE gage for ri in pressure.

g. Adjust BYPASS valve until TOTAL FLOW g indicates 25 phr.

h. Actuate DC POWER switch off and on five times. Solenoid valve shall open and close each time at 14 to 30 vdc.

i. Adjust BYPASS valve until TOTAL FLOW g indicates 50 phr, and repeat preceding step h.

NOTE

In following step j., place valve in suitable container, or cover outlet side of fuel solenoid valve to avoid splashing of fuel.

j. Turn BYPASS valve until GAGE NO. 4 HIG PRESSURE gage indicates 495 to 505 psi.

k. Actuate DC POWER switch on and off five t Valve shall open and close each time.

l. Check solenoid valve for evidence of leak Leakage shall not exceed one drop per minute.

m. Turn BYPASS valve until GAGE NO. 4 PRESSURE gage indicates zero psi.

n. Position DC POWER switch to OFF.

o. Connect No. 4 (1/4 inch diameter) hose fro OUTLET NO. 3 STATIC PRESSURE port on test to inlet port of solenoid valve. Cap outlet port. (See figure 8-32.)

p. Turn STATIC BYPASS knob to closed positi

q. Using test stand handpump, bring hydraulic pressure up to 1500 psi. Read pressure on GAGE NO. 1 STATIC PRESSURE gage. No leakage is allowed.

r. If limits cannot be met, reject starting fuel solenoid valve.

8-55. FUNCTIONAL TESTING OF CHECK FILT VALVE (T53-L-15/701 Engines). Proceed as fol lows:

a. Using suitable air supply, check pressure which valve opens. Valve should open at a pres of 0.5 to 1.0 psig.

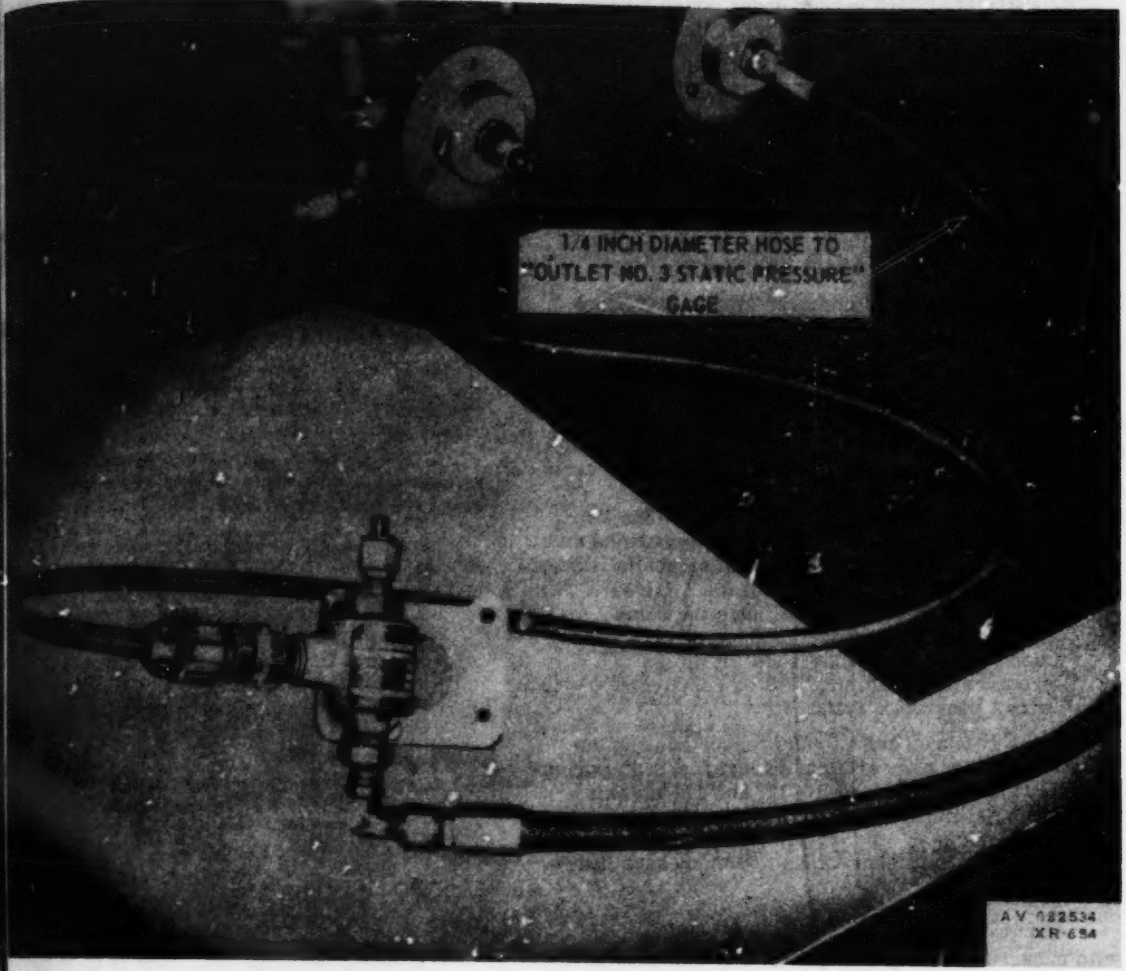


Figure 8-32. Starting Fuel Solenoid Valve Test Connections

b. Using calibrating fluid (item 11, table 2-2), ed to a temperature of 50 to 90°F, apply pres- e of 95 to 105 psig in the opposite direction of w.

(1) Internal leakage shall not exceed 6 cc per ute.

(2) External leakage is not allowed.

c. Reject check valve assembly if assembly does pass preceding test.

. ASSEMBLY OF ENGINE SUBASSEMBLIES.

. ASSEMBLY OF INLET HOUSING ASSEMBLY.

figure 6-29.) Proceed as follows:

a. Install filter in holding fixture (LTCT413). ll disc (8) and setscrew (9) into filter (7). Tighten screw as required. (Refer to table 11-3, reference number 84.)

CAUTION

In following step b., do not slide allen wrench into setscrew (9) when tightening setscrew (10).

b. Install setscrew (10) into filter and tighten as required. (Refer to table 11-3, reference number 85.) Remove filter from fixture.

c. Using test fixture (LTCT216), flow-check power takeoff oil supply nozzle assembly from slotted end. Attach oil pressure line from oil flow check stand (LTCT313) to adapter assembly.

d. Turn oil pressure valve knob until supply pressure gage indicates 30 psi at temperature range to 95 to 100°F (35 to 41°C).

e. Place graduated beaker under power takeoff oil supply nozzle assembly and obtain quantity of oil for one minute. This quantity shall be 480 to 530 cc., when using oil (item 64, table 2-2), and 456 to 506 cc. when using oil (item 63, table 2-2).

f. If desired quantity cannot be obtained, disassemble oil supply nozzle and replace disc (8). Reassemble and repeat test.

g. Place packing (6) on outside of filter (7), and insert power takeoff oil supply nozzle assembly into inlet housing and secure with retaining ring (11).

h. Place packings (4 and 5) in starter and pump pad cover (3) of inlet housing and secure with bolts (1) and washers (2). Tighten bolts as required and lockwire.

8-58. ASSEMBLY OF COMPRESSOR HOUSING ASSEMBLY. (See figure 6-28.) Proceed as follows.

NOTE

> The procedure applies to either half of compressor housing assembly.
>
> Rematched stator vane assemblies shall meet all assembly requirements. Halves of rematched stators shall have the same degree of foreign object damage or erosion wear within established limits (an eroded stator half shall not be rematched with a noneroded half).

a. With removed half of compressor housing assembly on bench, reinsert first through fourth stage compressor vane assemblies (8, 10, 11, and 12) and exit guide vane assembly (13) into their appropriate slots.

b. Secure compressor vanes to compressor housing half as follows:

(1) Secure first through fourth stage vanes with capscrews (4, 5, 14, and 16) and washers (3, 6, 15, and 17). Tighten center screws as required. (Refer to table 11-3, reference number 102.) Tighten outer screws as required. (Refer to table 11-3, reference number 101.)

(2) Secure exit guide vane with bolts (18), washers (19), capscrews (1), and bolt retainers (2). Tighten center bolts as required. (Refer to table 11-3, reference number 103.) Tighten outer bolts as required. (Refer to table 11-3, reference number 104.) Tighten capscrews as required. (Refer to table 11-3, reference number 105.)

c. Lockwire bolts and deform retainers into slot in capscrew and slot in housing.

8-59. ASSEMBLY OF REAR BEARING SUPPORT ASSEMBLY (T53-L-7/7A/15 Engines). (See figure 6-26.) Proceed as follows:

a. Install bearing outer race (6) into support assembly (1).

b. Select shim (5) to obtain pinch fit on bearing as given in table 11-4, reference number 5.

c. Install shim and plate (4) and secure to suppo
assembly with tabwashers (2) and bolts (3).

d. Tighten bolts as required. (Refer to table 11-
reference number 5.) Bend tabwashers.

e. Using oil flow check stand (LTCT313), flow-
check propeller shaft rear bearing support as follo

(1) Bolt a suitable test fixture to the rear be
ing support, with an installed union that fits over o
inlet port on side of support.

(2) Attach 1/2-inch oil pressure line from o
flow check stand (LTCT313) to union on test fixture

(3) Turn oil-pressure valve knob until SUPP
PRESSURE gage indicates 68 to 72 psi.

(4) Maintain this pressure and read oil flow
rotometer. Oil flow shall be 260 to 380 phr meas
at oil temperature of 90 to 110°F (32 to 43°C).

CAUTION

> In following step (5), use care when opening oil jets. Open only enough to obtain correct flow. Do not open more than 0.034 inch maximum.

(5) If oil flow cannot be met, open oil jets to
obtain required flow.

8-60. ASSEMBLY OF REAR BEARING SUPPORT ASSEMBLY (T53-L-701 Engine). (See figure 6-27 Proceed as follows.

CAUTION

> If a new bearing outer race is to be installed, the matching inner race (8, figure 3-36) must also be replaced (refer to paragraph 9-20).

a. Install bearing outer race (4, figure 6-27) a
cage of bearing into support assembly (3) with ser
number of bearing facing upward.

b. With depth gage, measure distance from ou
race of bearing (4) to bearing liner flange.

c. Select shim (5) to obtain pinch fit on bearin
given in table 11-4, reference number 9.

d. Install shim (5) and plate (6), and secure to
support assembly with six bolts (7).

e. Tighten bolts as required. (Refer to table
reference number 16.)

8-61. ASSEMBLY OF REDUCTION GEAR ASSEM BLY (T53-L-7/7A/15 Engines). (See figure 6-22 Proceed as follows.

NOTE

If the propeller shaft (30, figure 6-22) has been removed from the bearing support (9), the complete reassembly of the reduction gear assembly must be accomplished by General Support personnel. (See steps m. through s.)

CAUTION

Propeller shaft 1-020-117-01, revision L, or earlier, shall not be used on T53-L-15 engines. These shafts can be identified by the three 2.70 inch wide slots cut in the forward carrier race.

a. Generously lubricate packings (29) with petro- (item 87, table 2-2) and install on thrust plug

NOTE

In following step b., propeller shaft plug shall be installed so that the puller threads are facing forward. Manipulate retainer into position, using looped safety wire and a long screwdriver.

b. With propeller end up, carefully install thrust plug (28), using extension of puller assembly (LTCT 4510 or LTCT2022 or LTCT177) to guide plug. Secure plug with retaining ring (27).

c. Inspect installed propeller shaft plug for damaged packings as described in following steps d. through f.

d. Direct clean, dry shop air into propeller shaft rear oil passage as shown in figure 8-33 and check for air pressure at rear face of propeller shaft plug.

e. If no air is felt, packings are not positioned properly. The shaft plug must be removed, packing replaced if necessary, and then reinstalled as described in preceding steps a. and b. Repeat inspection in step d.

f. If air is felt, packings and shaft plug are properly positioned and further reassembly is possible.

g. Generously lubricate packing (26, figure 6-22) with shortening, (item 95, table 2-2) and install on propeller shaft plug (25, figure 6-22).

NOTE

In following step h., the propeller shaft plug shall be installed so that the puller threads are facing forward.

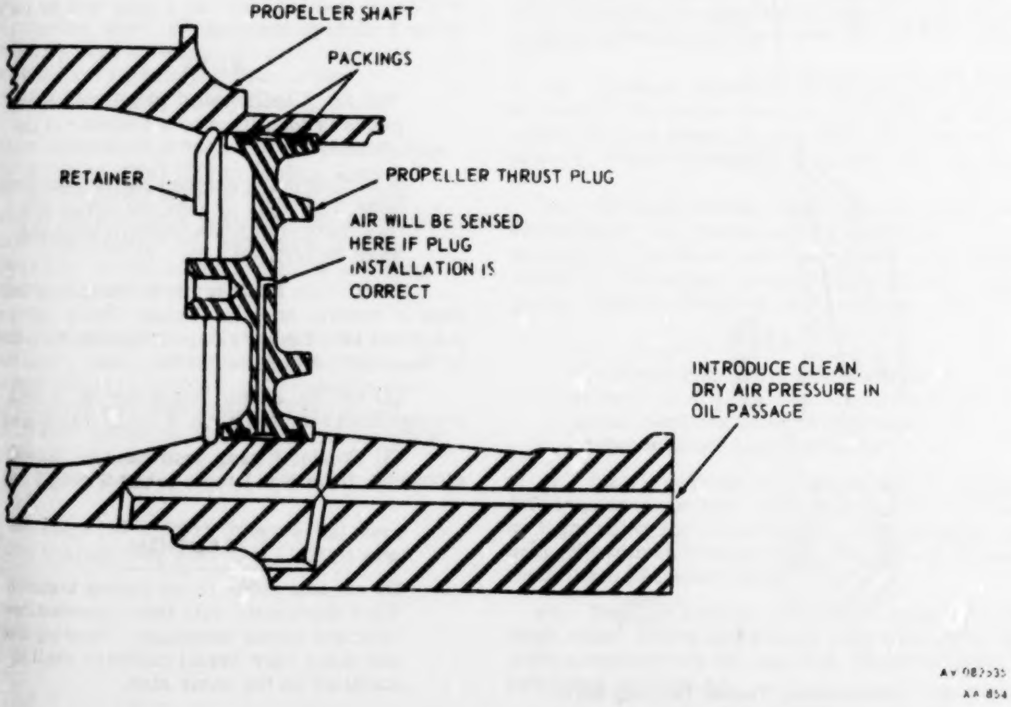

PROPELLER SHAFT
PACKINGS
RETAINER
PROPELLER THRUST PLUG
AIR WILL BE SENSED HERE IF PLUG INSTALLATION IS CORRECT
INTRODUCE CLEAN, DRY AIR PRESSURE IN OIL PASSAGE
AV 082535
AA 854

Figure 8-33. Propeller Thrust Plug Installation (T53-L-7/7A/15)

h. Carefully install propeller shaft plug into propeller shaft and secure with retaining ring (24).

NOTE

Step i. is necessary only if bearing is replaced. If the same bearing is used, use a shim of the same thickness as recorded during disassembly.

i. Determine thickness of shim (11) to obtain pinch fit on bearing (12) as described in following steps j. through l. (See figure 8-34.) Pinch fit measurement should be as given in table 11-4, reference number 1.

j. Measure thickness of outer race of bearing (dimension B, figure 8-34).

k. Using vernier or micrometer depth gage, measure from rear face of front bearing liner to face of liner lip (dimension A).

l. Measure from forward face of retaining plate to face of plate lip (dimension C). Add dimension C to dimension A and subtract this dimension from dimension B. The resulting dimension, minus 0.006 inch, is the required thickness of shim (11, figure 6-22). Use as many shims as required. Shim (11) is 0.020 inch thick and consists of 0.002 inch laminations.

m. Lubricate outer race of bearing (12) with Lubriplate (item 67, table 2-2) and press bearing firmly into bearing support (9). Use arbor press and suitable sleeve to contact bearing OD when pressing.

n. Install shim (11), of thickness determined in preceding step l., and bearing retainer plate (10). Secure with bolts (7) and tabwashers (8). Tighten bolts as required and lock by bending tangs of tabwashers.

o. Measure ID of bearing (12).

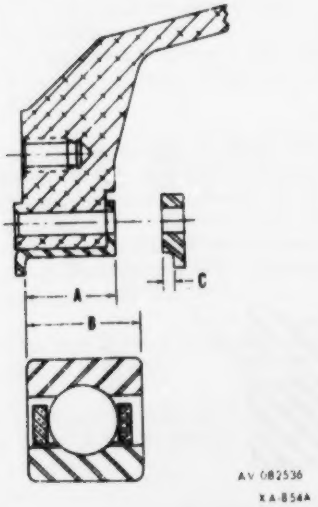


Figure 8-34. Determining Thrust Bearing Shim Thickness (T53-L-7/7A/15)

p. Measure OD of bearing journal on propeller shaft (30).

q. Subtract dimension obtained in step p. If difference indicates low interference fit (0.0005 inch tight or less), use arbor press and suitable sleeve to contact bearing inner race, and firmly seat thrust bearing against the shoulder on the propeller shaft. If high interference fit is indicated, assemble propeller shaft and bearing support housing as outlined in following steps r. and s.

CAUTION

Do not use an open flame in following step r.

r. Heat bearing support (9), with bearing (12) installed, to 160°F using oven, hot oil, or bench-type cylindrical heating unit or bore heater (LTCT6354) i conjunction with bore heater control (LTCT14547).

s. Remove support from heat source and quickly install on propeller shaft. Using arbor press and suitable sleeve to contact bearing inner race, firml seat thrust bearing against the shoulder on the propeller shaft.

NOTE

It is recommended that gears being reused be installed in positions from which they were removed.

t. Select and identify three planet gears (32, figure 6-22) and tag gears as No. 1, 2, and 3. No. 1 ge will be installed in the 12-o'clock position in the propeller shaft; No. 2 gear will be installed in the 4-o'clock position, and No. 3 gear will be installed in the 8-o'clock position.

NOTE

The No. 1 tooth on all planet secondary gears is identified by a chamfer at the aft end.

If numbers are scribed on the gear tooth ends, they may or may not agree with this method of tooth identification and shall be ignored.

(1) Locate No. 1 tooth on secondary (small) gear of number one planet gear. Using yellow opaq ink (item 126, table 2-2), paint a line along the len of the outer edge of the tooth.

(2) On No. 2 gear, mark the No. 8 tooth counterclockwise from No. 1 tooth (chamfered).

(3) On No. 3 gear, mark the No. 8 tooth clockwise from No. 1 tooth (chamfered).

CAUTION

Do not mix outer races during assembly. They must mate with their intended inner race and roller assembly. Bearing inner and outer race serial numbers shall be installed on the same side.

NOTE

If bearings that were removed are to be reused, install bearings into same bores from which they were removed and note position numbers.

Select six bearings and, with arbor press and e, install bearing inner races (39) on the planet s. If tight fit is indicated, inner race may be ed to approximately 160°F for ease of installation.

Install No. 1 planet gearshaft (32) in holding re (LTCT4018 or LTCT645) with forward face Secure with ring (LTCT4016) if using fixture CT4018), or clamps if using fixture (LTCT645).

CAUTION

In following step w., use care to prevent shearing lock cup.

Install lock cup (40) and left-hand threaded nut With torque wrench and wrench assembly CT569), tighten nut as required. (Refer to table reference number 2.) Lock nut by deforming cup into slots in four places.

Invert planet gearshaft (32) in holding fixture repeat preceding step w. using right-hand ded nut (52).

Repeat preceding steps v., w., and x. on No. 2 gears.

NOTE

The propeller shaft (30) and carrier (50) in following step z. below are matched parts and must be kept together. The serial numbers must be identical.

Position assembled propeller front bearing sup-(9) and propeller shaft (30) in holding fixture T247) with propeller shaft serial number and marks at the 6-o'clock position. Install pack-) on bearing support (9), and rotate support scavenge port is also at the 6-o'clock position. assembly to prevent rotation.

Install planet gear bearing outer races (31) in-peller shaft, using soft-faced mallet if necess-Place three planet gears on propeller shaft in their tive locations (preceding step t.) but do not Tilt aft ends inward to allow torquemeter plate bly (33) and internal ring gear (34) to be in-. (See figure 6-25.)

If seal rings (36 and 37, figure 6-22) were d from internal ring gear (34), install new ngs.

NOTE

In following step ac., check for correct positioning of the alignment pin between the propeller reduction internal gear (34) and torquemeter plate.

ac. Lubricate 24 torquemeter balls (35) with thin coat of shortening (item 95, table 2-2) and install into ball sockets of torquemeter plate (33). Align ball sockets and position ring gear on plate.

ad. Place three equally spaced 3/4-inch spacer blocks on support flange to maintain gap between torquemeter plate and support assembly. Hold torquemeter plate and ring together and place onto spacer blocks with circumferentially marked teeth at 12-o'clock position. (See figures 6-23 and 6-25.)

ae. Lift No. 1 gear to vertical position, and align the yellow tooth between the teeth with circumferential marks at 12-o'clock position on ring gear. Gently work forward inner race and rollers downward into bearing outer race in propeller shaft.

(1) Repeat procedure for No. 2 gear, aligning yellow tooth between the teeth within radial marks at 4-o'clock position on the ring gear.

(2) Repeat procedure for No. 3 gear, aligning yellow tooth between the teeth within the radial marks at 8-o'clock position on the ring gear.

af. Remove spacer blocks and gently work plate and ring gear down to avoid cutting packing. The gears will fall into place. Check alignment of gear and support by inserting pin (1-060-037-01) and secure ring gear to support with three counter sunk screws (38, figure 6-22).

ag. Recheck alignment by lifting gears slightly to check if the yellow tooth on each gear is between marks on ring gear. If all marks on gears are not aligned, repeat preceding steps ad., ae., and af.

ah. To check timing, turn support exactly four revolutions. All timing marks should have returned to original alignment position. If any of the timing marks fails to align, the gear is not installed properly. Repeat preceding steps ad., ae., and af.

NOTE

In following step ai., match marks on carrier must align with marks on shaft. Serial numbers must be identical. (Refer to preceding step z.)

ai. Install bearing outer races (51) in carrier (50) in proper position, referring to serial numbers on tags, using soft-faced mallet, if necessary. Coat seal (42) with shortening (item 95, table 2-2), and install into propeller shaft.

aj. Position carrier over planet gear assemblies, align match marks and secure with bolts (49). Tighten bolts progressively as required. (Refer to table 11-3, reference number 8.)

ak. Using dial indicator, check end play of planet gear assemblies. End play shall be as given in table 11-4, reference number 2. If end play is not within limits bearing inner and outer races (31, 39, 51, and 54) must be replaced.

CAUTION

When lockwiring bolts in following step al., ensure that cut ends of lockwire do not fall into reduction gear assembly.

al. After establishing correct end play, lockwire bolts (49).

am. If sealing rings (48) were removed, carefully reinstall in the grooves of carrier (50). Rotate rings to ensure that there is no binding.

an. Using thickness gage, check side clearance. Clearance shall be as given in table 11-4, reference number 8. If clearance is not obtained, replace sealing rings. Space end joints 90 degrees apart around journal.

NOTE

If propeller shaft (30) was removed from the bearing support housing, a flow check of the assembly should be performed as described in following steps ao. through aw. If the propeller shaft was not removed, these steps may be omitted and reassembly continued.

ao. Carefully slide test fixture (LTCT571) over sealing rings on propeller shaft rear carrier.

ap. Position reduction carrier assembly on oil flow check stand (LTCT313).

aq. Attach 1/2-inch hose from within oil flow check stand cover to fitting on test fixture.

ar. Turn on oil flow check stand. Oil temperature shall be 90 to 110°F (32 to 43°C).

as. Turn oil pressure valve knob until SUPPLY PRESSURE gage indicates 68 to 72 psi.

at. Observe that oil is flowing from thrust plug (28), and oil is flowing through all bearings.

au. Read oil flow on rotometer mounted on oil flow check stand. Oil flow shall be 1675 to 2075 pounds per hour.

av. If required oil flow cannot be met, remove oil flow test fixture and forward reduction gear assembly to Depot Maintenance.

aw. If required oil flow is met, remove oil flow test fixture and continue with reassembly.

ax. Install packing (5) into seal housing assembly (6).

NOTE

In following step ay., lubricate propeller shaft seal (4) with lubricating oil (item 64, table 2-2) before installing into housing.

ay. Using arbor press and suitable adapter to contact OD of propeller shaft seal (4), press seal into seal housing.

az. Install shield seal (22, figure 6-22) into se housing assembly (6), and secure with retaining ring (3).

ba. Position packing (23) on propeller shaft (30)

CAUTION

In the following step bb., ensure spacer (2) is installed with smooth side towards the nose case or thrust nut (1) will not seat properly.

bb. Install spacer (2) on propeller shaft.

bc. Install packing (19) in groove on face of bea ing support housing.

CAUTION

In following step bd., do not shear the retainers (20).

bd. Position seal housing assembly on bearing support housing, and secure with bolts (21) and retainers (20). Tighten bolts as required and lock b deforming retainers into seal housing and into sl of bolts.

be. Install thrust nut (1), but do not torque at this time.

bf. Measure ID of propeller shaft rear bearin inner race (47).

bg. Measure OD of bearing journal on carrier (50).

CAUTION

In following step bh., do not mix bearing components. Bearing inner and outer race serial numbers must match and face in the same direction when installed.

bh. Subtract dimension obtained in preceding step bg. from dimension obtained in step bf. If difference indicates low interference fit (0.005 in tight or less), use arbor press and suitable slee to contact bearing inner race, and firmly seat be ing inner race against shoulder on propeller shaf rear carrier. If high interference fit is indicate assemble carrier and bearing as outlined in follo ing steps bi. and bj.

CAUTION

In following step bi, do not use on open flame.

Heat propeller shaft rear bearing inner race to 160°F, using oven, hot oil, or bench-type trical heating unit.

Remove bearing inner race from heat source ickly install on propeller shaft rear carrier. arbor press and suitable sleeve to contact ing inner race, firmly seat support bearing race against the shoulder on the propeller shaft carrier.

Measure distance from edge of support bear- er race to face of hub of propeller shaft car- . (See figure 8-35, dimension A.)

Subtract 0.008 inch from this dimension. The t is thickness of bearing pinch shim (46, figure) required. Select shim from one of the follow- to obtain pinch fit as given in table 11-4, refer- number 4.

SHIM	THICKNESS
1-020-112-01	0.020 - 0.022 inch
1-020-112-02	0.024 - 0.026 inch
1-020-112-03	0.028 - 0.030 inch
1-020-112-04	0.032 - 0.034 inch
1-020-112-05	0.036 - 0.038 inch

Install bearing pinch shim (46, figure 6-22).

Install washer (45).

Install new tabwasher (44) with tabs in journal

Install spanner nut (43) and tighten as required. to table 11-3, reference number 6.)

NOTE

If the tab on the tabwasher (44, figure 6-22) does not line up with the slot in the nut, use a tabwasher of a different thickness or another nut. If spare tabwashers and nuts are not available, spanner nut (43) may be lapped on a lapping stone.

CAUTION

In following step bq., ensure that broken tab does not fall into reduction gear assembly.

bq. Bend tab of tabwasher (44) into notch of spanner nut (43). Break off remaining tab flush with nut.

8-62. ASSEMBLY OF FIRST STAGE TURBINE NOZZLE ASSEMBLY (T53-L-7/7A Engines). (See figure 6-17.) Proceed as follows:

a. Place first stage-turbine nozzle on a suitable work area with forward face down.

NOTE

After hot end inspection, use new screws (5) and tabwashers (4) in following step b. Because of excessive wear of hot end internal hardware, use of new screws and tabwashers helps to minimize maintenance and engine failure.

b. Secure first stage turbine nozzle flange (3) to first stage turbine nozzle (2) with new screws (5) and tabwashers (4).

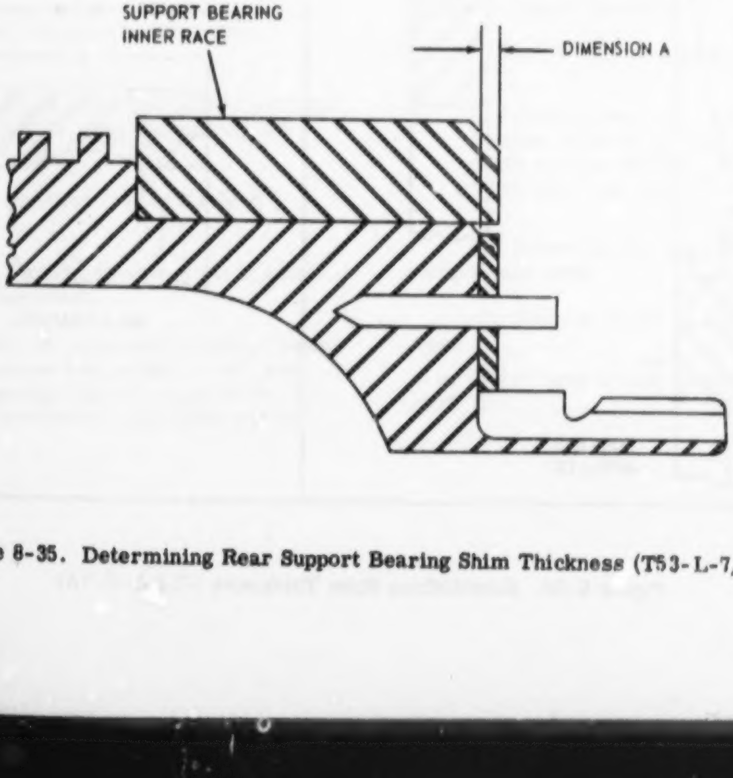


Figure 8-35. Determining Rear Support Bearing Shim Thickness (T53-L-7/7A/15)

8-63. ASSEMBLY OF SECOND STAGE TURBINE ROTOR ASSEMBLY (T53-L-7/7A Engines). (See figure 6-14.) Proceed as follows:

a. If seal (7) has been removed, install new seal in housing (8) as follows:

(1) Position seal housing, forward end up, on base (LTCT2637, detail of LTCT482).

(2) Install packing (6) in groove on seal.

(3) Position seal and press into housing.

(4) Place washer (LTCT2638 detail of LTCT 482) and flat washer (LTCT9023-13, detail of LTCT 482) over seal.

(5) Position handle (LTCT2667, detail of LTCT 482) on stud (LTCT2639, detail of LTCT482).

NOTE

Position installation disc to seat firmly on seal surface.

(6) Rotate handle to press seal into housing. Secure seal with retaining ring (5).

b. Obtain aft axial clearance of forward impeller to establish thickness of shim (25) as follows:

NOTE

This procedure is necessary only if components have been replaced.

(1) Using vernier or micrometer depth ga measure, on forward impeller (10), distance (Dim ension A, figure 8-36) from aft face of outer flan to aft face of inner flange.

(2) Using micrometer, measure, on forwar retaining ring (13, figure 6-14), thickness (Dimen sion B, figure 8-36) of leg.

(3) Subtract dimension A from dimension

(4) Add 0.046 inch to result obtained in pre ceding step (3) to allow for clearance of impeller bearing end play and No. 4 bearing pinch.

(5) (Deleted)

(6) (Deleted)

(7) Select a shim that corresponds to thick determined in steps (1) through (4).

EXAMPLE:

Dimension A = 0.120 inch
Dimension B = 0.158 inch
B - A = 0.158 inch - 0.120 inch = 0.038 inc
0.038 inch + 0.046 inch = 0.084 inch
Desired shim thickness = 0,084 inch

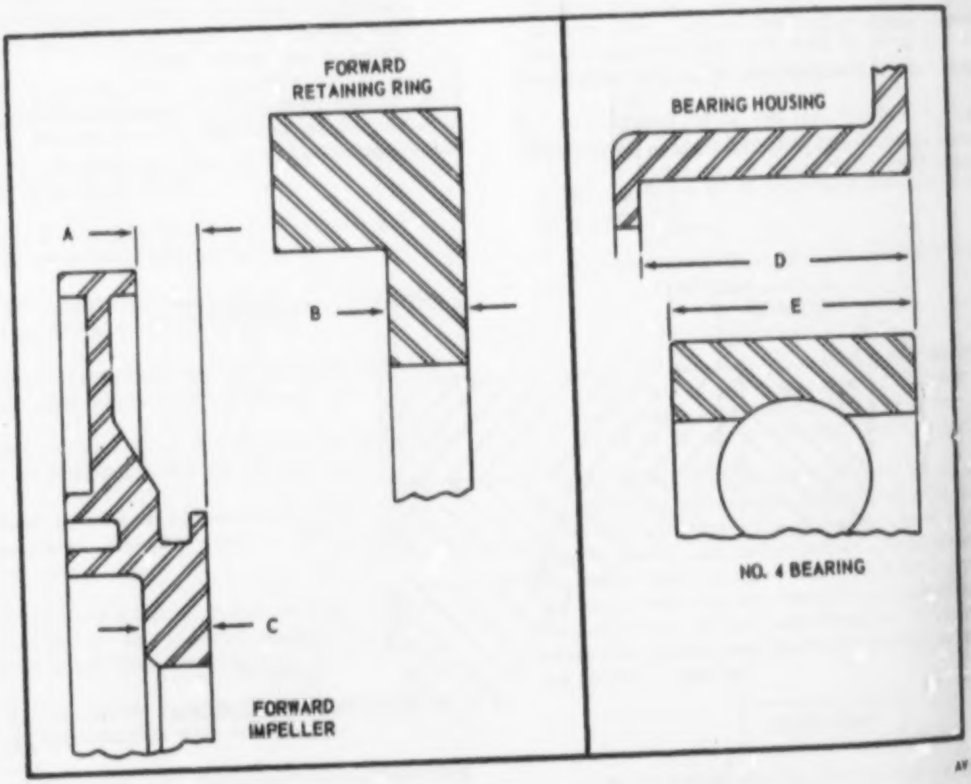


Figure 8-36. Establishing Shim Thickness (T53-L-7/7A)

Establish thickness of shim (9, figure 6-14) lows:

NOTE

This procedure is necessary only if com- ponents have been removed.

(1) Using micrometer, measure, on forward ler (10), thickness (Dimension C, figure 8-36) r flange.

(2) Add rear shim thickness (determined in ng step b.) to impeller inner flange thickness.

(3) Subtract result obtained in step (2) from inch.

(4) Select shim that corresponds to thickness ned in steps (1) through (3).

EXAMPLE:

Dimension C = 0.138 inch

(Rear shim = 0.084 inch)

0.084 inch + 0.138 inch = 0.222 inch

0.300 inch - 0.222 inch = 0.078 inch

Desired shim thickness = 0.078 inch

Using plastic mallet, gently tap No. 3 bearing race (14, figure 6-14) into forward end of g housing (15).

CAUTION

Be certain that ring with correct part mber is inserted. Ensure ring is ot cocked when tightening screws. Do ot interchange rings.

Position forward retaining ring (13) in bearing g, install screws (12). Install packing (26) (11).

Install forward impeller (10) in forward g ring (13).

Install seal and housing assembly (4) in bear- ing (5) and align holes.

Position deflector (2) over seal housing assem- align holes. Secure both deflector and seal to bearing housing (15) with eight bolts (3). e bolts with molybdenum disulfide powder , table 2-2).

i. Tighten bolts as required. (Refer to table 11-3, reference number 34.) Lockwire bolts.

j. Install selected shim (9, figure 6-14) on turbine rotor shaft. (Refer to preceding step c. for desired shim thickness.)

CAUTION

Be careful not to damage carbon seal (7) when inserting assembly over shaft in following step k.

k. Invert and position bearing housing assembly on second stage turbine rotor (1).

NOTE

Rear shim shall seat against aft face of impeller inner flange,

l. Install selected shim (25). (Refer to preceding step b. for desired shim thickness.)

m. Using installing tool (LTCT481), press No. 3 bearing inner race and rollers (24) onto second stage turbine rotor (1) as follows:

(1) Install adapter bushing (LTCT4310, detail of LTCT481) in end of second stage turbine rotor shaft.

(2) Position inner race and rollers on shaft, followed by adapters (LTCT4311 and 4312, details of LTCT481).

(3) Install thrust washer (LTCT9023-10 detail of LTCT481) on screw (MS16182-103, detail of LTCT481).

(4) Using lubricating oil (item 63 or 64, table 2-2), lubricate screw threads and turn screw and handle assembly into plug.

NOTE

In following step (5), rotate bearing housing while pressing to ensure that parts are not binding. Ensure that inner race and rollers are fully seated.

(5) Rotate handle to press inner race and rollers onto shaft.

(6) Remove screw and handle assembly and plug.

n. Install spacer (23) on second stage turbine rotor (1).

o. If necessary, select shim (22) to maintain axial pinch on No. 4 bearing outer race as given in table 11-4, reference number 57. Proceed as follows:

(1) Using vernier or micrometer depth gage, measure depth of bearing housing (dimension D, figure 8-36).

(2) Using micrometer, determine axial dimension of No. 4 bearing outer race (dimension E).

(3) Subtract dimension E from dimension D.

(4) Add a nominal 0.005 inch to result of step (3) to determine thickness of shim.

p. Install shim (22, figure 6-14) in bearing housing.

CAUTION

In following step q. when installing bearing, ensure that bearing-to-bearing housing alignment is concentric.

q. Using installing tool (LTCT481) with cup, simultaneously press No. 4 bearing (21) onto turbine rotor shaft and into bearing housing.

r. Remove installing tool from shaft.

CAUTION

Be certain that ring with correct part number is inserted. Ensure ring is not cocked when tightening screws. Do not interchange rings.

s. Insert rear retaining ring (20) into bearing housing until seated against bearing. If removed, install screws (19).

t. Install rear impeller (18).

NOTE

In following step u., do not lubricate spanner nut.

u. Install lock cup (17) and spanner nut (16). Tighten spanner nut as required. (Refer to table 11-3, reference number 27.)

CAUTION

In following step v., be certain that lock cup does not shear.

v. Bend tabs of lock cup into slots 180 degrees apart in spanner nut.

8-64. ASSEMBLY OF SECOND STAGE TURBINE SUPPORT ASSEMBLY (T53-L-7/7A Engines). (See figure 6-13.) Proceed as follows:

a. Place second stage turbine rotor assembly (1) on holding fixture (LTCT40).

b. Install seal (2) or packing (3) on aft end of turbine rotor assembly.

c. Place exhaust diffuser assembly (4) over tu
bine rotor assembly and align holes.

d. Secure exhaust diffuser to turbine rotor wi
screws (5). Tighten screws as required. (Refer
table 11-3, reference number 26.)

8-65. ASSEMBLY OF POWER TURBINE NOZZL AND CYLINDER ASSEMBLY (T53-L-7/7A Engin (See figure 6-12.) Proceed as follows.

CAUTION

Joint where sealing ring mating ends overlap shall be positioned as close to the center of a seal segment as possible.

NOTE

If a new sealing ring (1) is installed in the following step (a), it may be locally fabricated. (Refer to Appendix C.)

a. Insert turbine seal spring (3), turbine seal
ment (2), and power turbine cylinder sealing rin
into turbine nozzle seal retainer assembly. A g
spot on sealing ring must be visible after install
Install special lockwire (9).

NOTE

Use new nozzle seal retainer bolts and tabwashers in following step b.

b. Position turbine nozzle seal retainer (4) o
second stage turbine nozzle (7). Position nozzle
and retainer on power turbine cylinder (8) and al
holes. Coat bolts with Ease-Off Lubricant (item 32, table 2-2), or Molykote Anti-Seize Thread Compound (item 78, table 2-2). Secure retainer
and nozzle to cylinder with tabwashers (6) and n
bolts (5).

8-66. ASSEMBLY OF FUEL VAPORIZER ASSE BLY (T53-L-7/7A Engines). (See figure 6-11.) Proceed as follows:

a. Position bushing (3) (1-130-176-01) on fue
divider (2).

CAUTION

An improperly installed fuel divider in following step b., can deflect all fuel through one fuel vaporizer exit leg. This condition will cause rapid burnoff of the remaining leg and subsequent damage to the combustion chamber.

b. Insert bushing (3) and fuel divider (2) into
vaporizer (1). Hold vaporizer up and sight throu
louvers to ensure that the fuel vaporizer splitter
slides into slot in fuel divider. If divider cannot
properly installed because of distortion of splitt
replace fuel vaporizer.

c. Perform functional test of fuel vaporizer assembly. (Refer to paragraph 8-67.)

d. Cap fuel vaporizer assemblies and place i
suitable rack until installation.

FUNCTIONAL TESTING OF FUEL VAPORIZ- EMBLY (T53-L-7/7A Engines). Proceed as s:

Test assembled fuel vaporizer assembly as s:

NOTE

In following step (1), the peening mark will prevent the separation of the fuel divider from the vaporizer tube during handling.

(1) If fuel divider is loose in relation to izer assembly tube, apply small peen mark on sleeve.

(2) Install fuel vaporizer tube in fixture assem- TCT4100 or LTCT411) on test stand (LTCT See figure 8-37.)

(3) Close all indicator valves.

NOTE

In following step (4), the EMERGENCY STOP switches are painted red and are located on each side of the test stand.

(4) Pull out two EMERGENCY STOP switches serve that pointer on AIR PRESS. TO VAPOR- TUBE indicator indicates positive air pressure.

(5) Press FUEL PUMP ON switch. Observe d indicator lamp lights. Open AIR REGULA- valve.

(6) Open FUEL SHUTOFF TO VAPORIZING valve and observe that fluid is flowing from zing tube.

(7) Adjust FUEL BYPASS VALVE knob until PRESS. TO VAPORIZING TUBE indicator es 390 to 419 psi.

(8) Adjust VAPORIZING TUBE PRESS. REGU- valve to obtain indication of 2 inches water m on water manometers.

(9) Place two graduated liter beakers under es on holding fixture.

(10) Permit beakers to fill for 60 seconds.

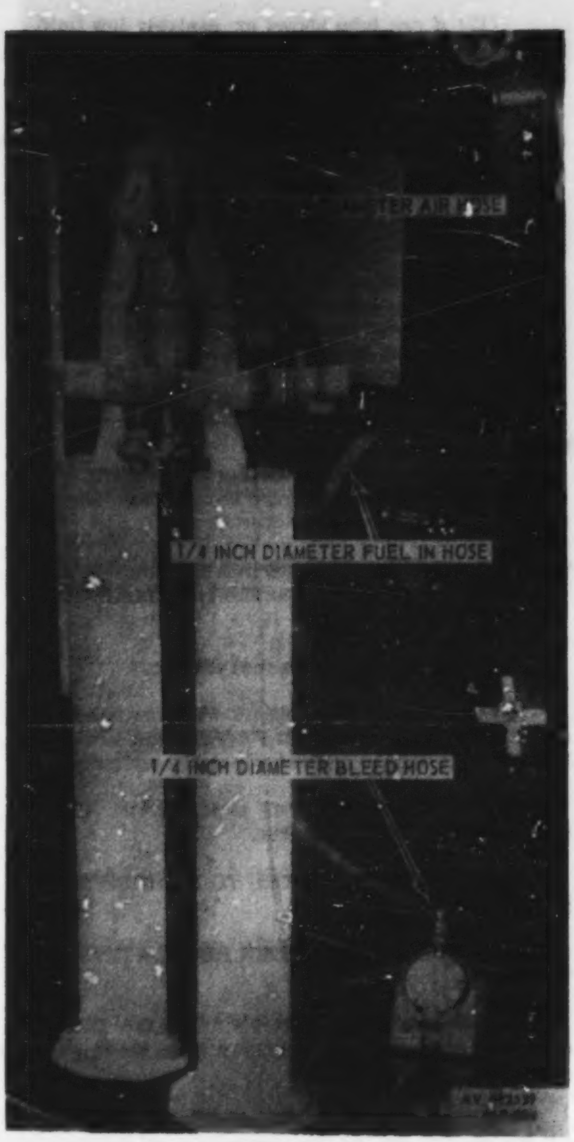


Figure 8-37. Fuel Vaporizers Test Setup (T53-L-7/7A)

(11) Remove two beakers. Add fluid level of both beakers to determine total fluid flow. Fluid flow from either vaporizer leg shall not exceed 53 percent of total flow.

(12) If one tube shows excessively low fluid level, fuel divider may be removed and cleaned and test repeated.

(13) If level of either tube continues to exceed 53 percent, inspect fuel vaporizer splitter inside fuel vaporizer. Replace vaporizer if damaged or deformed.

NOTE

> If the fuel divider has functioned properly while installed in the vaporizer, it is not necessary to accomplish the individual functional test of the divider.

b. If vaporizer assembly fails the functional test, test fuel flow divider as follows:

(1) Install fuel flow divider in test fixture (LTCT409) on test stand (LTCT314). (See figure 8-38.)

(2) Connect No. 4 (1/4 inch diameter) hose, with fuel divider adapter, to FUEL OUTLET TO FLOW port of test stand.

(3) Install adapter on fuel divider.

(4) Pull out EMERGENCY STOP switches and observe that pointer on AIR PRESS. TO VAPORIZING TUBE indicator indicates positive air pressure.

(5) Press FUEL PUMP switch to ON. Observe that red indicator lamp lights.

(6) Open INLET PRESS. TO FLOW DIVIDER indicator valve.

(7) Open FLOW DIVIDER REGULATING VALVE.

(8) Open FUEL SHUTOFF TO FLOW DIVIDER valve and observe that fluid flows from holding fixture drain tubes.

(9) Adjust FUEL BYPASS VALVE knob until INLET PRESS. TO FLOW DIVIDER indicator indicates 14 to 16 psi.

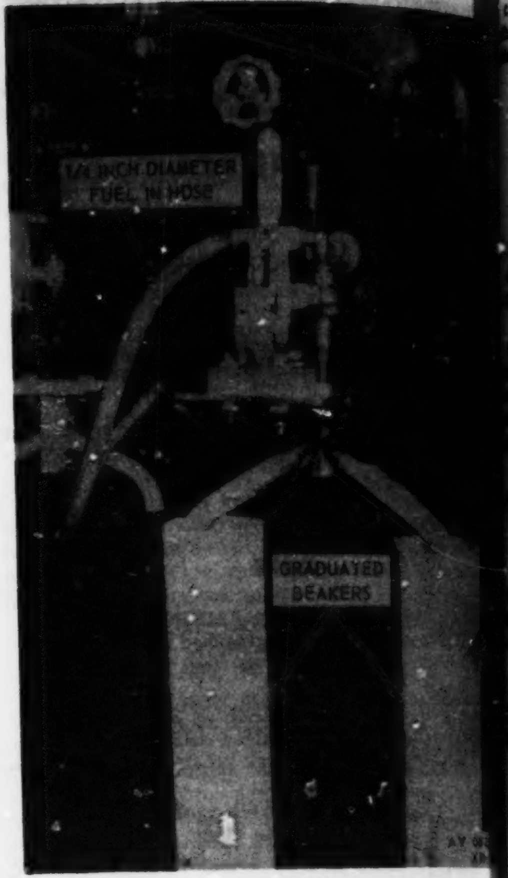
(10) Position two graduated liter beakers under holding fixture drain tubes.

(11) Permit beakers to fill for 30 to 60 seconds.

(12) Remove beakers. Add fluid level of both beakers to determine total fluid flow. Fluid flow from either drain tube shall not exceed 53 percent of total flow.

(13) If one tube shows excessively low fluid flow, fuel divider may be cleaned and the test repeated.

(14) If flow from either drain tube still exceeds 53 percent of total flow, reject fuel divider.



Fuel 8-38. Fuel Flow Divider Test Setup (T53-L-7/7A)

8-68. ASSEMBLY OF COMBUSTION CHAMBER SEMBLY (T53-L-7/7A Engines). (See figure 8- Proceed as follows:

NOTE

> Studs are located at the 1-, 5-, and 8-o'clock positions. Petrolatum (item 87, table 2-2) applied to bracket will hold washer in position during assembly.

a. Position washers (7) on three studs of co tion chamber liner assembly (2) that do not have flange.

b. Place combustion chamber liner assembly combustion chamber housing (3) and align ignit ports.

NOTE

> In following step c., first, tighten nuts in sequence on eight studs that do not have washers; then tighten nuts on the three remaining studs.

ecure liner assembly to combustion housing ts (6). Tighten nuts as required. (Refer to 11-3, reference number 33.)

CAUTION

en installing or aligning vaporizer as- mblies in following step d., ensure that ngs on vaporizers are not bent or oken.

stall fuel vaporizer assemblies (1, figure combustion chamber assembly.

roceeding clockwise, secure vaporizer as- to combustion chamber assembly with nuts (4). Using wrench (LTCT57), tighten snug fit. Install plastic caps to protect of vaporizers.

(Deleted)

Figures 8-39 and 8-40 deleted.

ASSEMBLY OF COMBUSTOR TURBINE BLY (T53-L-7/7A Engines). (See figures 8-9.) Proceed as follows:

Assemble combustion chamber (paragraph and power turbine nozzle and cylinder assem- (paragraph 8-65).

b. Install complete power turbine nozzle and cylinder assembly (1, figure 6-9) into combustion chamber (2). Align holes. Support nozzle assembly. Insert and tighten new screws (19).

NOTE

After a hot end inspection, use new special bolts (18) in following step c.

c. Position combustion chamber housing with flange down. Place second stage turbine support assembly (3) on combustion chamber assembly (2) and align holes, with exhaust thermocouple mounts located at approximately 1-, 4-, and 10-o'clock positions. Coat new special bolts (18) with Ease-Off Lubricant (item 32, table 2-2) or Molykote Anti-Seize Thread Compound (item 78, table 2-2) and, using adapter wrench (LTCT4081) and standard torque wrench, secure support assembly to combustion chamber housing with bolts. Tighten bolts only enough to secure parts.

NOTE

Centering of support assembly can be accomplished by inserting four feeler gages of equal thickness at the 12-, 3-, 6-, and 9-o'clock positions before bolts are tightened to proper torque.

NOTE

washers may be used in lieu of lock-
in following step d.

ck blade tip clearance at eight positions,
s apart. Insert feeler gage between sec-
turbine cylinder and second stage turbine
. Rotate turbine wheel one full turn at each
Radial clearance shall be as given in table
erence number 55. Tighten bolts as re-
Refer to table 11-3, reference number 22.)
bolts in pairs.

r tightening bolts, check blade tip clear-
ake certain that clearance is not altered.

ck clearance between OD of power turbine
eal flange and ID of power turbine nozzle
Clearance shall be as given in table 11-4,
number 62. If clearance is less than 0.015
ork nozzle to increase clearance.

ricate suitable length of 0.070 inch dia-
e with a 90-degree bend 2 inches from
nsert wire through support assembly aft
that wire fits (D, figure 8-41) between
e nozzle inner shroud and second stage
de roots (four places, 90 degrees apart).
rance shall be as given in table 11-4,
number 61.

CAUTION

revent oil leaks in following step h.
ower tubes must seat perfectly.
ating is still not perfect, replace
.

NOTE

rfect seat will be indicated by an un-
n ring on the tapered seat of the
r turbine tube.

ly coat tapered seats of two power turbine
gure 6-9) with iron-blue pigment (item 55,
r similar agent. Install tubes into top and
ts of the second stage turbine support as-
and thread finger-tight. Remove tubes and
ts.

ating is imperfect, check for cleanliness
es and bearing connectors. Interchange
repeat step h.

en each power turbine tube as required.
ble 11-3, reference number 25.) Lock-
to adjacent tabs.

CAUTION

Do not damage vaporizer threads when installing fire shield in following step k.

k. Place combustor turbine assembly on workbench, with diffuser up, and position fire shield (5) on locating pin on outer flange of combustion chamber assembly (2). Install fuel vaporizer adapter nuts (6). Tighten nuts as required. (Refer to table 11-3, reference number 32.) Lockwire in pairs at four locations. Lockwire three remaining nuts as a group.

l. Install igniter plug and starting fuel nozzle in each fire shield mounting pad. (Refer to paragraphs 5-138 and 5-32.)

m. (Deleted)

n. Place new packing (13) on adapter (12), and install into power turbine tube (4). Tighten adapter as required. (Refer to table 11-3, reference number 24.)

CAUTION

When installing the power turbine oil nozzle in following step o., position it with tangs at 90 degrees off the engine centerline. Install oil nozzle vertically. Do not rotate.

o. Place packing (11) on oil nozzle (10) and screw power turbine oil strainer (9) onto oil nozzle finger-tight. Insert into tube.

p. Install packing (8) on power turbine oil strainer housing (7), and screw housing into adapter (12) finger-tight. Place one wrench on oil strainer housing and another wrench on adapter. Tighten oil strainer housing as required. (Refer to table 11-3 reference number 23.) Lockwire adapter and housing together and to adjacent tab.

q. Install packing (16) on the power turbine oil tube connector (17) and install connector in tube. Tighten connector as required. (Refer to table 11-3, reference number 31.) Lockwire connector.

NOTE

To ensure proper seating of the support cone on the combustion chamber in following step r., tap the V-band coupling with a soft-faced mallet, starting at the middle and moving toward the bolts at the ends. Tighten the nuts. Repeat tapping and tightening until nuts are snug.

r. Install support cone (14) over fire shield (5); align cutout with locating pin on outer flange of combustion chamber assembly (2).

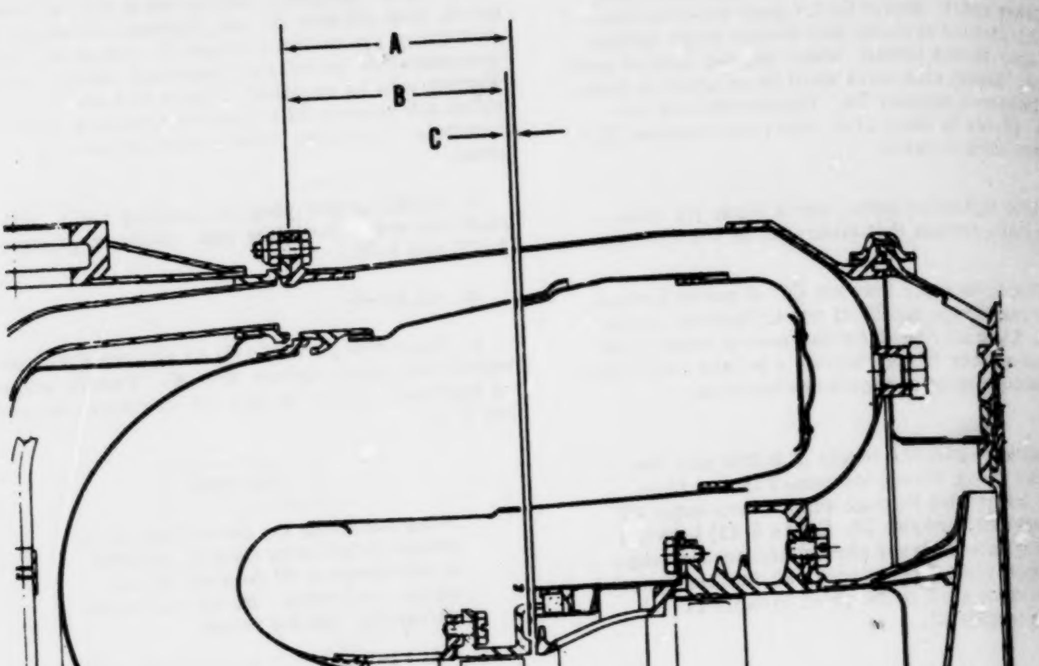


Figure 8-41. Turbine Clearance and Expansion Gap (T53-L-7/7A)

stall V-band couplings as follows:

NOTE

V-band couplings (1 and 6, figure 6-8) re removed, install as outlined in llowing step (1). If V-band couplings and 7) were removed, install as tlined in following step (2).

) Position V-band couplings (1 and 6) over cone and combustion chamber flange, with g ends at approximately the 4- and 10-o'clock s, and secure with spacers (3 and 4), bolts ew nuts (5).

) Position V-band couplings (10 and 7) over cone and combustion chamber flange, with g ends at approximately the 4- and 10-o'clock s, and secure with spacers (9) and new nuts

CAUTION

following step t., ensure that an equal , plus or minus 3/32 inch, exists tween V-band coupling ends. If gap not obtainable, replace V-band.

ghten V-band coupling nuts as required. (Re- le 11-3, reference number 21.) Seat clamp g. Release torque to zero pound-inches. s as required. (Refer to table 11-3, refer- ber 21.) Lockwire drilled-head bolts only guration A using lockwire (item 60A, table

stall exhaust thermocouple harness.

SEMBLY OF EXHAUST DIFFUSER SUP- CONE ASSEMBLY (T53-L-15/701 Engines). re 6-21.) Proceed as follows.

NOTE

fer to tags for support assembly loca- n.

sition support assembly (4) on flanges (6

stall pins (3) into support assembly.

sition retainers (2 and 5) on support assem- d secure with screws (1).

ckwire screws.

peat preceding steps a. through d. for re- support assemblies (8, 9, 10, 11, and 12).

SEMBLY OF POWER TURBINE ROTOR ING HOUSING ASSEMBLY (T53-L-15/701 . (See figure 6-20.) Proceed as follows.

CAUTION

Ensure that bearing housing area is free of all contaminant prior to reassembly. Drain and flush engine if inspection reveals oil impeller coating loss or main oil filter exhibits contamination.

a. Select shim (26) to maintain axial pinch fit on outer race of bearing (25) as given in table 11-4, reference number 73. Proceed as follows:

(1) Using vernier depth gage, measure depth of bearing housing (dimension A, figure 8-42).

(2) Using micrometer, determine axial dimension of bearing outer race (dimension B).

(3) Subtract dimension B from dimension A.

(4) Add nominal 0.005 inch to result of preceding step (3) to determine thickness of shim.

NOTE

In following step b., install seal with part number facing up (away from housing).

b. Install packing (10, figure 6-20) into seal housing (11). Lubricate seal (9) with shortening compound (item 95, table 2-2). Using arbor press and removing and installing tool (LTCT4947), press seal

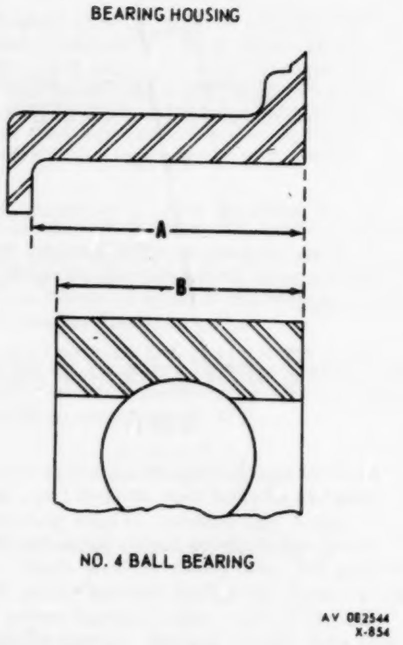


Figure 8-42. Establishing Shim Thickness (T53-L-15/701)

into seal housing (11). Install retaining ring (7) into seal housing assembly.

c. Install packing (32) on tube (31). Install tube in bearing housing (27).

d. Using arbor press and suitable brass bushing, press outer race of bearing (29) into bearing housing (27).

NOTE

In following step e., if seal (12) is to be installed, ensure groove in bearing housing (27) is clean. Coat groove with shortening compound (item 95, table 2-2) to facilitate holding seal in housing during assembly.

e. Align screw holes in ring assembly with screw holes in bearing housing (27), and insert ring assembly into bearing housing. Secure ring assembly to bearing housing with screws (15). Install seal (12) in forward groove of bearing housing (27), or packing (3) on ring assembly (16).

f. Install packing (30) on end of tube (31).

g. Place impeller (13) in ring assembly (16). Install seal housing (11) over impeller. Ensure that tube (31) is properly seated in seal housing.

h. Position deflector support (6) on seal housing (11) so that cutout in deflector is aligned with boss on seal housing.

i. Coat threads of bolts (5) with Ease-Off Lubricant (item 32, table 2-2), or Molykote Anti-Seize Thread Compound (item 78, table 2-2). Thread bolts into bearing housing (27, figure 6-20) and tighten to 70 to 75 pound-inches torque. Lockwire bolts.

NOTE

Do not lubricate bolts in following step j.

j. Position plate (4) on turbine rotor (2) and secure plate with bolts (1). Tighten bolts to 25 to 30 pound-inches torque.

k. Using arbor press and suitable brass bushing, press seal ring (8) onto turbine rotor shaft.

NOTE

In following step l., ensure that tangs on ring are aligned with slots in impeller (13).

l. Using arbor press and suitable brass bushing, press ring (14) onto power turbine shaft.

CAUTION

Ensure that seal (9) rides onto seal ring (8) without damaging the seal.

m. Install power turbine rotor in holding fixtur (LTCT58). Install bearing housing assembly on tu bine rotor.

CAUTION

Do not damage rollers in following step n.

n. Using arbor press and suitable brass bushin press bearing (inner race and rollers) (29) onto power turbine shaft.

o. Place spacer (28) on power turbine shaft.

NOTE

In following step p., use shim having correct thickness as determined in preceding step a.

p. Install shim (26) into bearing housing (27).

q. Using arbor press and suitable brass bushin press bearing (25) onto power turbine shaft and into bearing housing.

r. Install retaining ring (24) into bearing housi and align screw holes. Secure ring to bearing housing with screws (23).

s. Install washer (22). Install impeller (21) a align slots in impeller with tangs on washer.

t. Install cover (20). Secure cover to retainin ring (24) with screws (19).

NOTE

Do not lubricate nut (17) in following step u.

u. Install power turbine rotor in holding fixtu (LTCT4553). Install lock cup (18) and nut (17). U wrench (LTCT915), tighten nut as required. (Ref to table 11-3, reference number 44.)

v. Secure nut (17) by deforming lock cup (1 into slot in nut at two locations.

8-73. ASSEMBLY OF COMBUSTION CHAMBER ASSEMBLY (T53-L-15/701 Engines). (See figure 6-19.) Proceed as follows.

CAUTION

Before assembly, inspect as follows: Dimples on ID of combustion chamber liner must contact OD of first stage gas producer nozzle deflector. This may be accomplished by applying iron-blue pigment (item 55, table 2-2) to the liner dimples and mating the nozzle and liner to simulate hot end installation. If contact is not evident through 360 degrees, carefully bend liner tabs inward as required.

Install starting fuel hose assemblies and check valve. (Refer to paragraph 5-16.)

NOTE

There are six studs in the liner assembly, but only three of the studs will accommodate the washers. Studs are located at the 1-, 5-, and 8-o'clock positions.

CAUTION

Slots in studs must face radially inward or tangs in housing will be damaged.

Place washers (9) (1-130-218-03) on three studs -256-02) of combustion chamber liner assembly and retain with shortening compound (item 95, 2-2).

CAUTION

In following step c., do not force liner into housing. Check and reposition studs if required.

Install liner assembly into combustion chamber assembly (7) with TOP index at 12-o'clock and igniter ports aligned.

Install key washers (3) and nuts (4) on liner studs. Do not tighten nuts.

To ensure proper alignment of combustion liner assembly (8) with combustion chamber assembly (7), install two alignment fixtures 4174) on housing assembly.

Tighten nuts on three studs without washers quired. (Refer to table 11-3, reference number Then tighten nuts on three remaining studs as (Refer to table 11-3, reference number Bend tabs of key washers to secure nuts.

Remove alignment fixture (LTCT4174).

8-74. ASSEMBLY OF COMBUSTOR TURBINE ASSEMBLY (T53-L-15/701 Engines). (See figures 6-8 and 6-18.) Proceed as follows:

a. Place power turbine rotor and bearing housing assembly (35, figure 6-18) forward, face down, into holding fixture (LTCT4553).

NOTE

In following step b., ensure groove in housing is clean. If seal (34) is to be installed, coat groove of housing with shortening compound (item 95, table 2-2) to facilitate holding seal in groove during assembly.

b. Install seal (34) or packing (37) in groove on aft end of bearing housing.

c. Place exhaust diffuser assembly (33) over bearing housing and align screw holes.

d. Temporarily install 1/4-28 bolts and flat washers through exhaust diffuser assembly and into bearing housing. Turn bolts evenly and pull exhaust diffuser over bearing housing.

e. Secure bearing housing to exhaust diffuser with screws (19). Tighten screws as required. (Refer to table 11-3, reference number 43.) Using bent 0.070 inch diameter wire, check for minimum clearance between second stage power turbine rotor and forward face of inner diffuser cone as given in table 11-4, reference number 74.

NOTE

If installed, remove combustion chamber liner assembly (8, figure 6-19) from combustion chamber assembly (14, figure 6-18) to facilitate reassembly in following step f.

f. Position exhaust diffuser and bearing housing on bench with exhaust diffuser rear flange down. Position combustion chamber housing assembly (7, figure 6-19) on flange of exhaust diffuser and align bolt holes on mating flanges.

g. Establish tip clearance between second stage power turbine rotor and second stage power turbine nozzle. (Refer to paragraph 8-75.)

CAUTION

In following step h., ensure that bolts do not bottom against seal housing.

h. Install power turbine spacer (8, figure 6-18) over end of power turbine rotor, and align bolt holes and match marks. Secure spacer with three equally spaced 5/16-24 bolts and washers.

i. Install second stage power turbine nozzle (11) and, using feeler gage, check clearance between power turbine spacer (8) and second stage power turbine nozzle (11). If clearance is less than 0.005 inch, rework nozzle, using half-round file to obtain clearance as given in table 11-4, reference number 82. Remove nozzle (11).

j. Establish clearance between first stage power turbine rotor and second stage power turbine nozzle (Dimension G, figure 8-43) as follows:

(1) Place locating bar (LTCT153) on flange of combustion chamber housing.

(2) Using vernier depth gage, measure from bar to outer shroud of second power turbine nozzle (Dimension A).

(3) Using vernier depth gage, measure from bar to power turbine spacer (8, figure 6-18) (Dimension B).

(4) Subtract dimension B (figure 8-43) from dimension A. Result is dimension C.

(5) Place first stage power turbine rotor (7, figure 6-18) on bench with forward face down. Position locating bar (LTCT153) on blade disc.

(6) Using vernier depth gage, measure from bar to spacer surface (dimension D, figure 8-43).

(7) Using vernier depth gage, measure from bar to shrouded tip of highest blade (dimension E).

(8) Subtract dimension E from dimension D. Result is dimension F.

(9) Subtract dimension F from dimension C. Result is dimension G.

NOTE

Shimming of the second stage power turbine nozzle in following step (10) will affect the axial clearance between the first stage power turbine nozzle and the first stage power turbine wheel.

(10) Dimension G must be as given in table 11-4, reference number 70. If desired dimension is not obtained, spacer is required to position second stage power turbine nozzle. Select and install necessary spacer (13, figure 6-18). (Refer to table 8-2.) Install ring (12, figure 6-18); second stage power turbine nozzle (11), and temporarily secure with four bolts (2) and pins (9).

k. Remove bolts and washers installed in preceding step h.

l. Install torque adjustment fixture (LTCT962) to rear of exhaust diffuser assembly and engage t of locking plate assembly with slots in bearing retainer nut. Secure plate assembly with three bolts. Replace combustor turbine assembly on bench wit exhaust diffuser rear face down.

m. Install gasket (36) over end of power turbine rotor shaft.

n. Position first stage power turbine rotor (7) end of power turbine rotor shaft and align bolt hol

NOTE

Ensure that locking plates (5) do not cover the three small airbleed holes in the sealing flange (6) in following step o.

o. Secure rotor with sealing flange (6), lockin plates (5), and new bolts (1-140-168-02) (4). Tigh bolts as required. (Refer to table 11-3, reference number 38.) Do not bend locking plate tabs at thi time. Remove torque adjustment fixture (LTCT9

p. Establish clearance between first stage po turbine nozzle and shrouded top of first stage po turbine rotor blades (dimension D, figure 8-44) follows:

(1) Place locating bar (LTCT152) on flang of combustion chamber housing.

(2) Using venier depth gage, measure fro to ring (12, figure 6-18) installed on combustion chamber housing flange (dimension A, figure 8-4

(3) Using vernier depth gage, measure fr bar to shrouded tip of highest first stage power bine blades (dimension B).

(4) Subtract dimension B from dimensio Result is dimension C.

(5) Place first stage power turbine nozzl figure 6-18) on bench with forward face down. tion locating bar (LTCT153) on aft flange of no

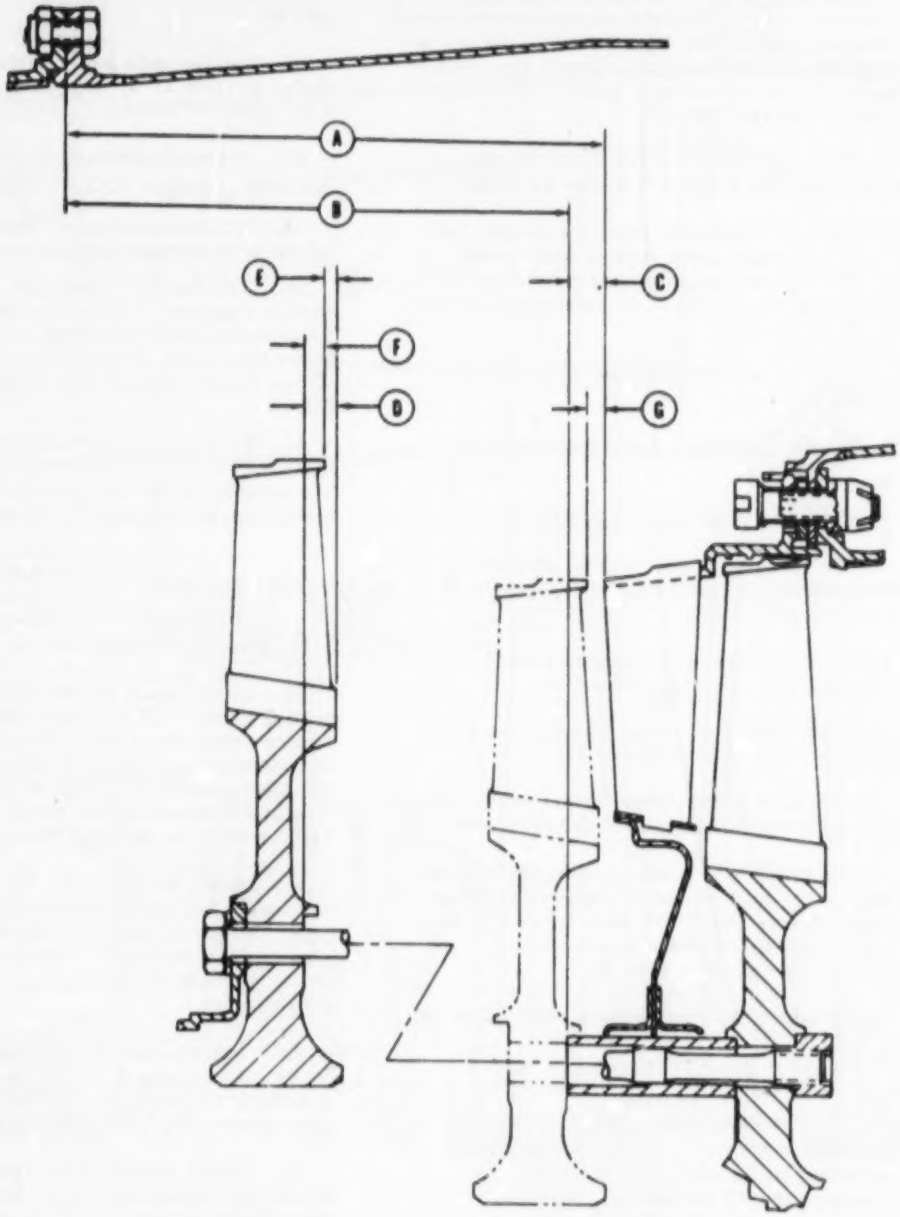
(6) Using vernier depth gage, measure bar to outer shroud (dimension E, figure 8-44)

(7) Subtract thickness of locating bar fr dimension E.

(8) Subtract dimension C from dimensio obtained in step (7). Result in dimension D.

(9) Dimension D must be as given in ta 11-4, reference number 69. If desired dimen is not obtained, spacer is required to positio stage power turbine nozzle. Select necessary spacer (10, figure 6-18).

q. Establish tip clearance between first st power turbine rotor and first stage power tu nozzle. (Refer to paragraph 8-76.)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B
E
C
F
D
G
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ure 8-43. Determining Clearance Between First Stage Power Turbine Rotor Assembly and Second Stage Power Turbine Nozzle Assembly (T53-L-15/701)

Table 8-2. Spacer Thickness

PART NUMBER	THICKNESS
1-140-276-01	0.022 to 0.028 inch
1-140-276-02	0.029 to 0.035 inch
1-140-276-03	0.036 to 0.044 inch

r. Position spacer (10, figure 6-18), selected in preceding step o., on ring (12). Install four equally spaced bolts (2 and 23) through spacer (10), ring (12), and into exhaust diffuser.

s. Position combustor turbine assembly at a 45-degree angle and support it in this position.

t. Position dial indicator against a pointer just inboard of first stage power turbine blade roots. Rotate power turbine assembly and record runout. Runout is as given in table 11-4, reference number 71. Record runout.

u. If runout is not within limits, loosen and retighten bolts (4).

v. Reposition combustor turbine assembly on bench.

w. Bend locking plate (5) tabs against bolts (4).

x. Ensure that proper spacer (10), selected in preceding step p., is installed. Remove bolts (2 and 23) installed in step r.

y. Install first stage power turbine nozzle (1) over power turbine rotor and align bolt holes.

z. Apply Molykote Anti-Seize Thread Compound (item 78, table 2-2) to bolts (2 and 23).

aa. Secure first stage power turbine nozzle with bolts (2 and 23) and locking plates (3 and 22).

ab. Using feeler gage, check clearance between first stage power turbine nozzle and sealing flange. If clearance is less than 0.015 inch, rework nozzle, using half-round file to obtain clearance as given in table 11-4, reference number 75.

ac. Bend tabs of locking plates against bolts and stake securely.

CAUTION

In following step ad., to prevent oil leaks, the power tubes must seat perfectly. If seating is still not perfect, replace tubes and repeat preceding step ac.

NOTE

A perfect seat will be indicated by an unbroken ring on the tapered seat of the power turbine tube.

ad. Lightly coat tapered seats of two power tur bine tubes (20) with iron-blue pigment (item 55, ta 2-2). Install tubes into top and bottom struts of ex haust diffuser and thread finger-tight. Remove tu and inspect seats.

ae. If seating is imperfect, check tubes for cle connectors. Interchange tubes and repeat precedi step ad.

af. Tighten each power turbine tube as require (Refer to table 11-3, reference number 42.) Lock wire tubes.

ag. Reinstall combustion chamber liner remov in step g.

ah. Position combustor turbine assembly on w bench, with exhaust diffuser side up.

ai. Position fire shield (30, figure 6-18) on co bustion chamber housing rear flange, and align pi combustion chamber housing with hole in fire shie assembly. If oil tubes are not concentric with hole in fire shield, remove fire shield and file holes as quired.

aj. To ensure proper alignment of combustion chamber liner with fire shield and combustion cha ber housing, position alignment fixtures (LTCT41 through these components. Remove fixtures.

CAUTION

Use care to prevent damage to nozzle seals in following step ak.

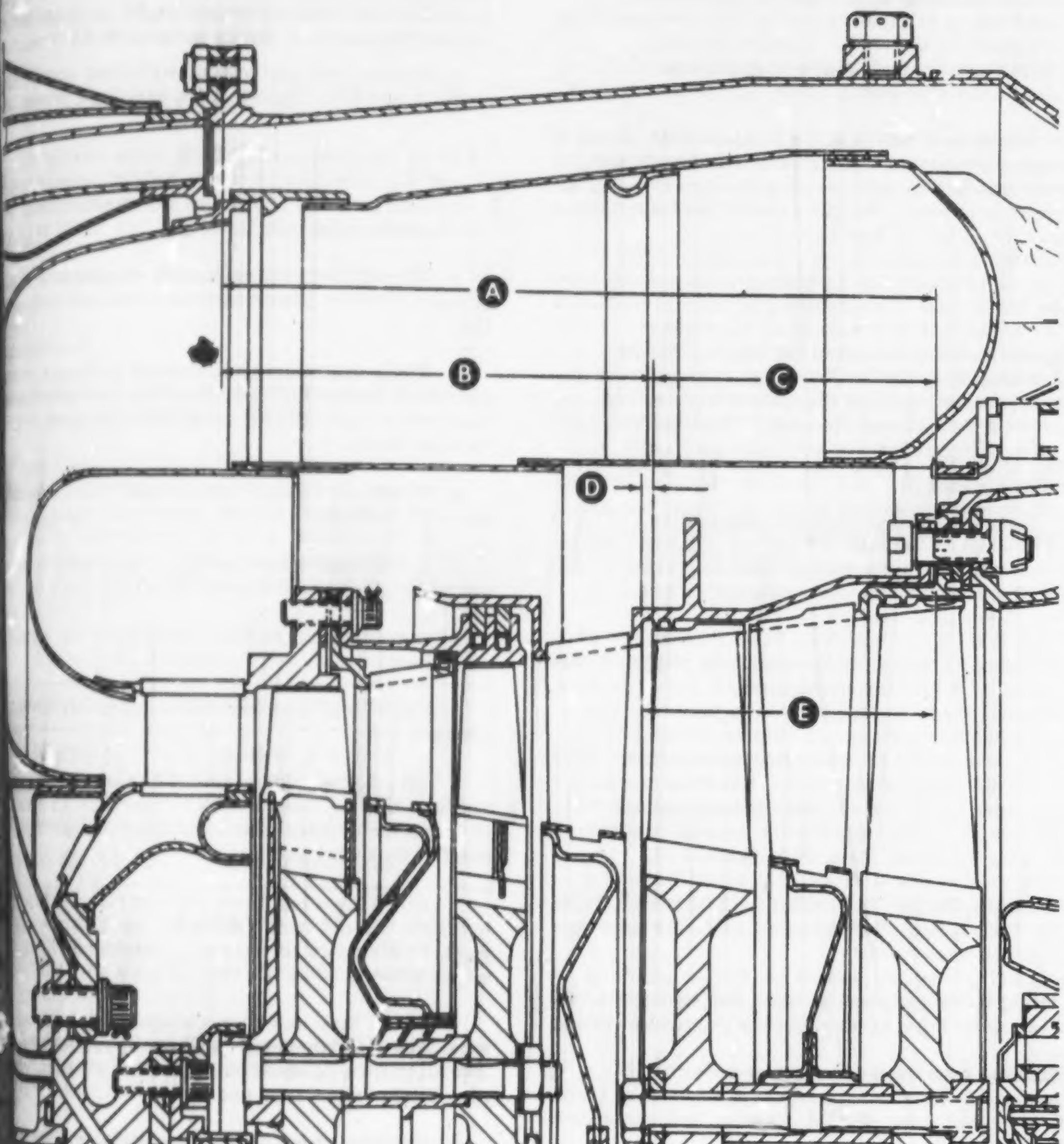
ak. Install seals (27) on fuel nozzles. Install sealing gaskets (28) on main fuel manifold (16) an secure with screws (29). Carefully position each fuel manifold assembly (16 and 26) over fire shie and align fuel nozzles with port holes. Install fu manifold assemblies and secure with bolts (25). Tighten bolts as required and lockwire.

al. Install strainer (19) into oil strainer hous adapter (17) at 12-o'clock position and tighten fin tight. Install oil strainer housing adapter (17) an packing (21) into tube. Tighten adapter as requir (Refer to table 11-3, reference number 21.) Loc wire adapter.

am. Install connector (31) and packing (32) i power turbine tube at 6-o'clock position. Tighte connector as required. (Refer to table 11-3, ref ence number 47.) Lockwire connector.

an. Install support cone assembly (24) over f shield and exhaust diffuser. Position starting fu ing manifold bracket at 12-o'clock position.

ao. Secure fire shield and support cone to co bustion chamber with V-band coupling assembly. V-band coupling assembly (1, figure 6-8) is to b used, proceed to following step.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B
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re 8-44. Determining Clearance Between First Stage Power Turbine Nozzle and Rotor Assemblies (T53-L-15/701) ap. If V-band coupling assembly (10) is to be used, omit following step aq. and proceed to step ar.

NOTE

To ensure proper seating of the support cone on the combustion chamber in step aq., tap the V-band coupling assemblies, starting at the middle and moving toward the bolts at the ends. Tighten the nuts. Repeat tapping and tightening until the nuts cannot be easily drawn up further.

aq. Position V-band coupling assemblies (1 and 6) over support cone and combustion chamber housing flange with attaching ends at approximately 4- and 10-o'clock positions. Secure assemblies with bolts (2), spacers (3 and 4) and nuts (5).

NOTE

To ensure proper seating of the support cone on the combustion chamber in following step ar., tap the V-band coupling assemblies starting at the middle and moving toward the bolts at the ends. Tighten the nuts. Repeat tapping and tightening until the nuts cannot be easily drawn up further.

ar. Position V-band coupling assemblies (7 and 10) over support cone and combustion chamber housing flange with attaching ends at approximately 4- and 10-o'clock positions. Secure assemblies with spacers (9) and new nuts (8).

as. Tighten V-band coupling nuts as required. (Refer to table 11-3, reference number 40.) Seal clamps by tightening. Release torque to zero pound-inches torque. Retighten as required. (Refer to table 11-3, reference number 40.) Ensure that an equal gap, plus or minus 3/32 inch, exists between V-band coupling assembly ends. If gap is not obtainable, replace V-band. Lockwire drilled-head bolts only on configuration A using lockwire (item 60A, table 2-2).

8-75. ESTABLISHING SECOND STAGE POWER TURBINE ROTOR TIP CLEARANCE (T53-L-15/701 Engines). Proceed as follows:

a. Using 0.020 inch copper wire and tape (item 102, table 2-2), determine actual tip clearance as follows:

(1) Measure thickness of tape.

NOTE

In following step (2), apply enough thicknesses of tape on blade tips so that the thickness of the wire, plus a single layer of tape on top of the wire, equals the minimum tip clearance of 0.025 inch.

(2) Secure short length of copper wire on tops of power turbine blades at three locations, 120 degrees apart. Place one short length of wire on forward tip of blade and one on aft tip of the same blade.

b. Paint tape with iron-blue pigment (item 55, table 2-2).

c. Select suitable spacer (13, figure 6-18) as indicated in table 8-2. Place spacer (nominal thickness 0.032 inch) and ring (12, figure 6-18), on combustion chamber flange and align bolt holes. Install three pins (9). Select pins to obtain loose fit as give in table 11-4, reference number 73A. Select pins of same dash number. (Refer to table 8-3.)

d. Secure ring and spacer with four equally spac bolts (2 and 23). Tighten bolts evenly to proper torq

NOTE

Use care not to rub against tape while performing step e.

e. Carefully position second stage power turbin nozzle (11) over power turbine rotor and into ring (12).

f. While maintaining downward pressure on nozzle rotate power turbine rotor one revolution, usin hand crank (LTCT4650) installed in second power turbine rotor.

g. Carefully remove nozzle and check tape for signs of rubbing.

h. If rubbing is not evident, tip clearance is acceptable.

i. If rubbing is evident, determine tip clearanc as follows:

(1) Select tape from each diameter which h greatest rub.

(2) If iron-blue pigment has been removed, but tape has not been cut, tip clearance is equal to diameter of wire plus total thickness of tape used at that position.

(3) If tape has been cut completely through, but wire has not been damaged, tip clearance is equal to diameter of wire plus thickness of tape under wire.

(4) If tape has been cut completely through wire appears damaged, measure diameter of wir Tip clearance is equal to minimum wire diamete plus thickness of tape under wire.

j. Tip clearance determined in preceding ste shall be as given in table 11-4, reference numbe If desired clearance is not obtained, recheck ali ment and torqueing of bearing housing to exhaust fuser or replace nozzles.

k. Remove all installed tapes and wires.

8-76. ESTABLISHING FIRST STAGE POWER T BINE ROTOR TIP CLEARANCE (T53-L-15/701 gines). Proceed as follows.

NOTE

Apply enough thickness of tape on blade tips in step a., so that the thickness of the wire, plus a single layer of tape on top of the wire, equals the minimum tip clearances of 0.025 inch.

a. Using 0.020 inch copper wire and tape (item table 2-2), determine actual tip clearance as ows:

(1) Measure thickness of tape.

(2) Secure short length of copper wire on tips wer turbine blades at three locations, 120 de- apart. Place one short length of wire on for- tip of blade and one on aft tip of the same blade.

b. Paint tape with iron-blue pigment (item 55, 2-2).

c. (Deleted)

d. Remove four bolts (2 and 23, figure 6-18) in- in ring (12). Remove pins (9).

e. Install spacer (10) (thickness determined in graph 6-20, step m.) on combustion chamber and align bolt holes. Install three pins (9). shall be selectively fitted to obtain loose fit ren in table 11-4, reference number 81A. The pins shall all be of same dash number. (Re- table 8-3.)

Table 8-3. Selective Pin Diameters

PART NO.	SHANK DIAMETER (inch)
1-190-021-01	0.2495 to 0.2505
1-190-021-02	0.2510 to 0.2515
1-190-021-03	0.2520 to 0.2525
1-190-021-04	0.2530 to 0.2535

NOTE

In following step f., use care not to rub against tape.

Carefully position first stage power turbine (1, figure 6-18) over first stage power turbine (7). Align bolt holes.

Secure nozzle to exhaust diffuser with four spaced bolts. Tighten bolts evenly to proper

Rotate power turbine rotor one revolution, us- crank (LTCT4650) installed in second power rotor.

Remove bolts that secure first stage power tur- zle and carefully remove nozzle.

j. Check tape for signs of rubbing. If rubbing is not evident, proceed to following step k. If rubbing is noted, omit step k. and proceed to step l.

k. If rubbing is not evident, tip clearance is acceptable.

l. If rubbing is evident, determine tip clearance as follows:

(1) Select tape from each diameter which has greatest rub.

(2) If iron-blue pigment has been removed, but tape has not been cut, tip clearance is equal to diameter of wire plus total thickness of tape used at that position.

(3) If tape has been cut completely through but wire has not been damaged, tip clearance is equal to diameter of wire plus thickness of tape under wire.

(4) If tape has been cut completely through and wire appears damaged, measure diameter of wire. The tip clearance is equal to minimum wire diameters plus thickness of tape under wire.

m. Tip clearance determined in preceding step l. shall be as given in table 11-4, reference number 72. If desired clearance is not obtained, recheck alignment and torqueing of bearing housing to exhaust diffuser or replace nozzle.

q. Remove all installed tapes and wires.

8-77. ASSEMBLY OF ACCESSORY DRIVE GEARBOX ASSEMBLY. (See figure 6-5.) Proceed as follows.

NOTE

To facilitate lockwiring in following step a., insert precut strands of wire into applicable holes in baffle before installation.

a. Install baffle (88, sheet 2) and secure with screws (86 and 87), spacers (83), new packing (85), and bolts (84). Lockwire screws and bolts.

b. Using soft-faced mallet, tap roller bearing outer race (55, sheet 1) into accessory gearbox housing assembly (90, sheet 2).

c. Using arbor press and sleeve bushing (LTCT 3640) press roller bearing inner race (56, sheet 1) onto journal of accessory drive gear assembly (57).

d. Coat teeth of accessory drive gear assembly with red lead (item 91, table 2-2).

e. Using arbor press and sleeve bushing (LTCT 3636), press ball bearing (10, sheet 1) onto outer pinion gearshaft assembly (9).

f. Using sleeve bushing (LTCT3654), press ball bearing (6) into pinion liner (4).

g. Using snapring pliers, insert and seal retaining ring (7) in groove of pinion liner. Install new packing (5).

NOTE

In following step h., shim shall correspond in thickness to shim removed during disassembly.

h. Install shim (8) on gearshaft assembly (9).

i. Using arbor press and suitable sleeve, press assembled pinion liner onto journal of gearshaft assembly (9). Install key washer (3) and retaining nut (2).

j. Install holder assembly (LTCT3833 replaces LTCT2039) in bench vise. Position liner and gearshaft assembly (1) in holding tool. Using spanner wrench (LTCT107), tighten retaining nut (2) as required. (Refer to table 11-3, reference number (62.) Lock key washer (3). Remove liner and gearshaft assembly from holder assembly.

NOTE

Step jA. applies to T53-L-15/701 engines which incorporate radial bearing housing (46).

jA. Install packing (47) on radial bearing housing (46). Insert housing into accessory gearbox housing assembly and secure with bolts (45). Tighten bolts.

k. Coat teeth of gearshaft assembly (9) with iron-blue pigment (item 55, table 2-2), and install liner and gearshaft assembly (1, sheet 1) into accessory gearbox housing assembly. Gently tap with soft-faced mallet until properly seated.

NOTE

Ensure that teeth of gear assembly (57) in following step l., mesh with teeth of gearshaft assembly (9).

l. Carefully install gear assembly (57) and roller bearing inner race (56) into roller bearing outer race (55).

m. Measure bore depth of thrust bearing liner (72, sheet 2). Measure width of outer race of ball bearing (71). Subtract bore depth from bearing width, and select shim (44, sheet 1) to obtain bearing pinch as given in table 11-4, reference number 86.

n. Using arbor press, press ball bearing (71, sheet 2) into thrust bearing liner (72). Position shim (73), thrust bearing liner (72) with ball bearing (71) installed, shim (44, sheet 1) and retaining plate (43) on accessory gearbox cover assembly (70, sheet 2). Secure with tabwashers (26, sheet 1) and bolts (27). Lock bolts with tabwashers.

o. Install gasket (89, sheet 2) on accessory gearbox housing assembly.

p. Using arbor press, press accessory gearbox cover assembly and ball bearing (71) onto accessory gearbox housing assembly (90) and journal of gear assembly (57, sheet 1). Secure with nuts (69, sheet 2) and washers (68).

q. Install new packing (42, sheet 1), spacer (41), lock cup (40), and spanner nut (39).

r. Position holding fixture (LTCT115) on accessory gearbox cover assembly. Ensure that tangs fixture engage slots of spanner nut.

s. Insert splined tool (part of holding fixture LTCT115), turn counterclockwise and tighten spanner nut (39) as required. (Refer to table 11-3, reference number 61.)

NOTE

Do not deform lock cup at this time.

t. Remove holding fixture (LTCT115), and rot gear several times.

u. Install holding fixture (LTCT4904 or LTCT on accessory gearbox cover assembly and in splin of gear assembly (57).

v. Install backlash gage (LTCT2099) in liner gearshaft assembly (1).

w. Using dial indicator, check backlash of gear assembly (57) and gearshaft assembly (9). Backl must be as given in table 11-4, reference number If backlash exceeds limits, remove and disassemb liner and gearshaft assembly (1) and select more suitable shim (8). Reassemble liner and gearsha assembly, install, and repeat backlash check.

x. When acceptable backlash has been establis position holding fixture (LTCT115) on cover assem mounting pad studs, and check to ensure that tang of holding fixture engage slots of spanner nut.

y. Insert splined tool into holding fixture and i splines of gear assembly (57).

z. Using suitable wrench, turn splined tool clo wise to remove spanner nut (39). Remove lock c (40).

aa. Remove spacer (41) and packing. Do not r move packing from spacer.

ab. Secure puller (LTCT142) to accessory gea box cover assembly. Turn handle to separate cov assembly from housing assembly. Remove puller

ac. Remove gear assembly (57). Examine too pattern on gear teeth. (Refer to paragraph 8-11 fo acceptable pattern.)

ad. Remove liner and gearshaft assembly (1, figure 6-5) from housing assembly and examine tooth pattern on gearshaft assembly (9). (Refer to paragraph 8-11 for acceptable pattern.)

ae. When correct backlash and gear pattern is accomplished, clean gears in drycleaning solvent (item 28, table 2-2).

af. Install liner and gearshaft assembly (1, sh 1, figure 6-5) into accessory gearbox housing ass bly. Tap gently with soft-faced mallet until sea properly.

NOTE

Ensure that teeth of gear assembly (57) mesh with teeth of gearshaft assembly (9) in following step ag.

install gear assembly (57) and roller bearing race (56) into roller bearing outer race (55).

Using arbor press and sleeve bushing (LTCT), install ball bearings (80 and 82, sheet 2) on pump drive gearshaft assembly (81).

Install oil pump drive gearshaft assembly into ssory gearbox housing assembly (90), and care- y mesh gear teeth with spur gear teeth of gear as- bly (57, sheet 1).

Using arbor press and sleeve bushing (LTCT , install bearings (62 and 64) on oil-air tor drive gearshaft assembly (63).

Install oil-air separator drive gearshaft as- bly (63), shaft first, into housing sasembly, and lly mesh gear teeth with spur gear teeth of assembly (57). Gently tap bearings to ensure seating.

Dip seal (58) in lubricating oil (item 63 or 64, 1-1), and install in accessory gearbox housing bly (90, sheet 2).

Using arbor press and sleeve bushings (LTCT and LTCT3640), install ball bearings (59 and et 1) on tachometer drive gearshaft assembly

Install tachometer drive gearshaft assembly into accessory gearbox cover assembly (70, 1), gear side first, carefully meshing gear with gear teeth of oil-air separator drive gear- assembly (63, sheet 1). Gently tap bearing to e proper seating.

Using arbor press and sleeve bushing (LTCT), install ball bearings (77 and 79, sheet 2) on ntrol drive gearshaft assembly (78).

Install fuel control drive gearshaft assembly short hub first, into accessory gearbox cover bly (70), carefully meshing gear teeth with teeth of oil pump drive gearshaft assembly (81).

Gently tap gearshaft assembly to ensure seating of bearing.

Position accessory gearbox cover assembly accessory gearbox housing assembly (90), care to align bearings properly.

Using arbor press and installing tool (LTCT press cover assembly onto housing assembly and gear assembly (57, sheet 1).

Secure with nuts (69, sheet 2), washers (68), o brackets (67).

Install packing (66) and plug (65).

Install connector (75) wich packing (74), and with screws (76).

Install spacer (41, sheet 1) with new packing lock cup (40), and spanner nut (39).

ax. Position holding fixture (LTCT115) on accessory gearbox cover assembly. Ensure that tangs of fixture engage slots of spanner nut.

ay. Insert splined tool (part of holding fixture LTCT115). Turn counterclockwise and tighten spanner nut as required. (Refer to table 11-3, reference number 61.)

az. Deform lock cup into spanner nut in three places, 120 degrees apart.

ba. Install packing (37) into oil seal housing (35).

NOTE

In following step bb., seal must be installed with solid side of seal case (side with part number) facing the starter-generator.

bb. Using arbor press and installer (LTCT270), press seal (38) into oil seal housing (35).

bc. Install packing (36) on hub of oil seal housing. Using arbor press and installation tool (LTCT511), press oil seal housing into cover assembly and secure with bolts (34). Lockwire bolts.

bd. Install packing (16) on tachometer drive bearing retainer (21). Using arbor press and installing tool (LTCT501), press seal (15) into tachometer drive flange.

be. Install tachometer drive bearing retainer (21) over studs of cover assembly, and secure with washers (24) and nuts (25).

NOTE

Use as many washers as necessary to secure tachometer drive flange for pressure test.

bf. Install packing (18) on hub of fuel control drive liner (19). Using arbor press and installing tool (LTCT100), press seal (17) into fuel control drive liner.

bg. Install fuel control drive liner (19) over studs and into housing assembly. Secure with bolts (20).

bgA. If removed, install gasket (54), pad cover (53), washer (52), and nut (51).

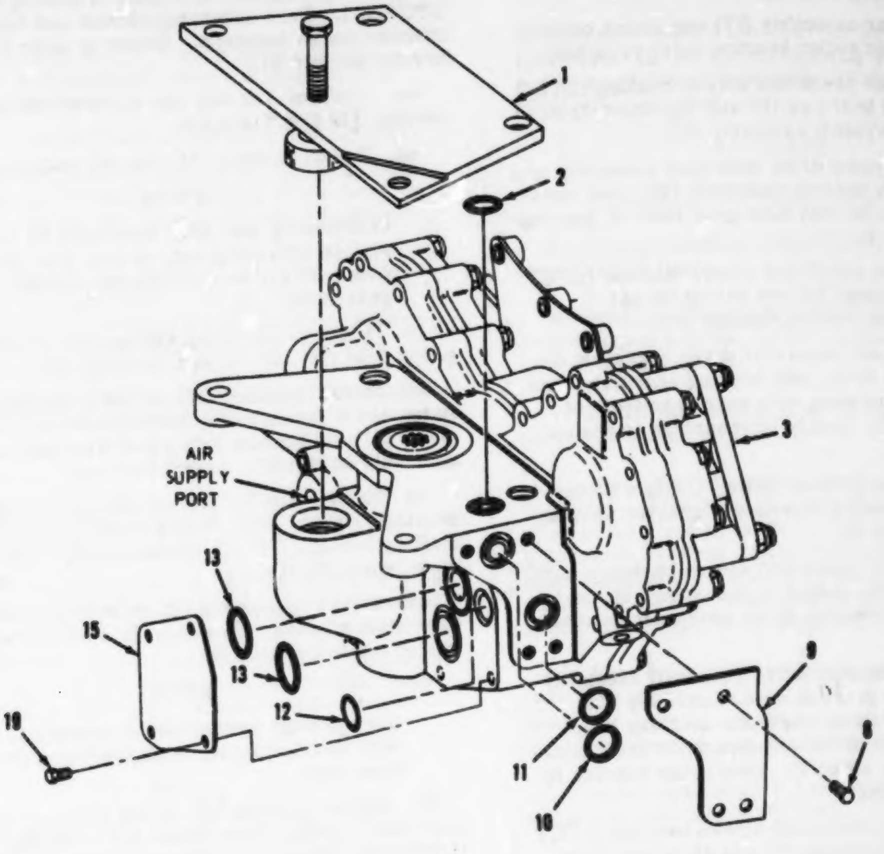
NOTE

In following step bh., if threads on chip detector port were repaired as outlined in paragraph 7-137, install packing, AN6227-10, in place of packing (92, sheet 2, figure 6-5).

bh. Install packing (92, sheet 2) on chip detector (93) and install chip detector in housing assembly.

bi. Install packings (11 and 13, sheet 1) on unions (12 and 14), and install unions into accessory drive gearbox cover assembly and tighten as required.

8-78. PRESSURE TEST OF ACCESSORY DRIVE GEARBOX ASSEMBLY. Prepare accessory drive gearbox assembly for pressure testing as shown in figure 8-45. Proceed as follows:



1. Test Fixture (LTCT207)
2. Packing (MS29561-114)
3. Accessory Drive Gearbox Assembly
4. (Deleted)
5. (Deleted)
6. Bolt (AN1029-6)
7. (Deleted)
8. (Deleted)
9. Blank-Off Plate
10. Packing (MS29561-115)
11. Packing (MS29561-114)
12. Packing (MS29561-115)
13. Packing (MS29561-122)
14. (Deleted)
15. Blank-Off Plate
16. (Deleted)
17. (Deleted)
18. (Deleted)
19. Bolt (AN1029-6)

Figure 8-45. Accessory Drive Gearbox Assembly - Preparation for Pressure Test

tall packings (12 and 13) into accessory drive assembly (3).

tall packings (10 and 11) into accessory drive assembly.

tall metal blank-off plates (9 and 15) on ac- drive gearbox assembly, and secure with and 19).

tall packing (2).

tall suitable fitting in air supply port.

tall test fixture (1) (LTCT207) as shown.

rough p. (Deleted)

tach air line to air supply port indicated in -45.

ing 8 to 12 psig air pressure, pressurize ry drive gearbox assembly and apply lubri- l (item 63 or 64, table 2-2), or leak test (item 57, table 2-2) to all seals and mating . Visually inspect for air leakage around all d around gasket between cover and housing les. No leaks are allowed.

NOTE

leakage is noted, disassemble accessory ive gearbox assembly and inspect for efective packings and seals. Replace de- ctive part and reassemble. Repeat pres- re test after reassembly.

hen accessory drive gearbox 1-080- 0-13 or 1-080-250-16 is installed, m following step rA.

ter completion of pressure test lubricate in- plines of gearshaft assembly (78, figure et 2) with Plastilube Moly No. 3 (item 2-2) or Multi Fax EP2 (item 79, table

bricate splines of zerol gear (57, figure et 2) with Plastilube Moly No. 3 (item 2-2) or Multi Fax EP2 (item 79, table

all gasket (33, figure 6-5), support (32), 1), and cover (30) over studs of accessory rbox assembly, and secure with washers nuts (29).

move nut (25) and washers (24); install) and cover (23), and secure with washers nuts (25). Tighten nuts to standard torque.

leted)

8-79. FUNCTIONAL TESTING OF CHIP DETECTOR.

(cold engine). Proceed as follows:

Use ohmmeter; if resistance is less than 400,000 ohms, remove chip detector. Do not remove chip detector, if resistance is 400,000 or more ohms.

8-80. ASSEMBLY OF OVERSPEED GOVERNOR AND TACHOMETER DRIVE ASSEMBLY (T53-L-7/7A/15 Engines) (ORGANIZATIONAL MAINTENANCE).

(See figure 6-1.) Proceed as follows.

NOTE

If filter (10) is to be installed, perform following steps a. through c. If filter assembly (3) is to be installed, perform steps d. and e.

a. Install filter (10) in plug (11) and tighten to 70 to 90 pound-inches torque.

CAUTION

Hold filter in soft-jawed vise to avoid damage to outer surface.

b. Position new packing (2) on plug (11).

c. Install plug and filter in housing. Tighten plug to 70 to 90 pound-inches torque. Lockwire plug.

d. Position new packing (2) on plug (1) and filter assembly (3).

e. Install filter assembly and plug in housing. Tighten plug as required. (Refer to table 11-3, reference number 76.)

f. Lubricate gasket (5), and position gasket on overspeed governor and tachometer drive assembly (4).

g. Lubricate seal (7) and, using installing tool (LTCT51), press seal into cover assembly (6).

h. Lubricate bearing lines on cover assembly (6), and position cover assembly overspeed governor and tachometer drive assembly (4). Using soft-faced mallet, gently tap cover assembly down until firmly seated. Secure cover assembly with bolts (8) and washers (9).

8-81. ASSEMBLY OF OVERSPEED GOVERNOR AND TACHOMETER DRIVE ASSEMBLY (T53-L-701 Engine) (ORGANIZATIONAL MAINTENANCE).

(See figure 6-2.) Proceed as follows:

a. Install packing (2) on filter assembly (3) and packing (2) on plug (1).

b. Insert filter assembly and plug into housing. Tighten plug as required. (Refer to table 11-3, reference number 92.) Lockwire plug.

8-82. ASSEMBLY OF OVERSPEED GOVERNOR AND TACHOMETER DRIVE ASSEMBLY (T53-L-7/7A/15 Engines) (DS AND GS MAINTENANCE).

(See figure 6-3.) Proceed as follows.

NOTE

If filter (5, figure 6-3) is to be installed, perform following steps a. through d. Use filter (3) and throttle assembly (6) to depletion. If filter assembly (3) is to be installed, perform steps e. and f.

CAUTION

In following step a., hold filter in soft-jawed vise to avoid damage to outer surface.

a. Install filter (5) in plug (4) and tighten as required. (Refer to table 11-3, reference number 55.)

b. Position new packings (2) on plug (4) and throttle assembly (6).

c. Lubricate throttle assembly (6) with shortening compound (item 95, table 2-2) and insert into housing (43).

d. Install plug in housing and tighten as required. (Refer to table 11-3, reference number 76.) Lockwire plug.

e. Position new packings (2) on plug (1) and filter assembly (3).

f. Install filter assembly and plug in housing. Tighten plug as required. (Refer to table 11-3, reference number 76.) Lockwire plug.

g. Using soft-faced mallet, gently tap bearing (23) into bearing liner (22) until seated. Tap ball bearing (54) into bearing liner (53). Using depth micrometer, measure distances from top of bearings to surfaces of liner flanges, and select shims to give 0.002 to 0.004 inch pinch fit on each bearing.

h. Using arbor press and bushing (LTCT3640 or LTCT68-10, detail of LTCT68), press bearing (19), spacer (20), and bearing liner (22) with bearing (23) installed, on tachometer drive shaftgear (18). Press ball bearing (50), bearing spacer (51), and bearing liner (53), with ball bearing (54) installed on upper drive shaftgear (49). Check for rotational freedom of both shaftgears within their liners. If necessary, gently tap shaftgears with soft-faced mallet to eliminate sticking or tightness.

i. Using arbor press and bushing (LTCT3640), press bearings (35 and 37) on gear (36), and bearings (40 and 42) on shaftgear (41).

j. Apply light coat of iron-blue pigment (item 55, table 2-2), on teeth of tachometer drive shaftgear (18) and insert shim (21), tachometer drive shaftgear and liner assembly (17), shim (24), and bearing retainer (25) into housing (43). Using soft-faced mallet, tap liner and shaftgear assembly to ensure proper seating. Install tabwashers (26) and bolts (27). Tighten bolts as required. (Refer to table 11-3, reference number 58.) Do not bend tabs on tabwashers (26) until backlash and pattern have been checked.

CAUTION

In following step k., ensure that key (30) does not shift during installation of shaftgear.

k. Insert key (31) in tachometer drive shaftgear (18) and, mating key with keyway in tachometer sh gear (30), install shaftgear; install tabwasher (29) and spanner nut (28).

l. Using wrench (LTCT1109, replaces LTCT214 tighten nut as required. (Refer to table 11-3, reference number 54.) Do not bend tabs on washer until backlash and gear pattern have been checked.

m. Place upper drive shaftgear and liner assem bly (48) in gear holder assembly (LTCT2037, repla LTCT277). Install tabwasher (59) and spanner nu (60). Using wrench (LTCT213), tighten nut as required. (Refer to table 11-3, reference number 59. Do not bend tabs on tabwasher until backlash and pattern have been checked.

n. Insert shim (52), upper drive shaftgear and liner assembly (48) (with tabwasher (59) and spann nut (60) installed), shim (55), and bearing retainer (56) into housing (43). Using soft-faced mallet, gently tap liner and shaftgear assembly to ensure proper seating. Install tabwashers (57) and bolts (58). Tighten bolts as required. (Refer to table 11-3, reference number 60.) Do not bend tabs on tabwashers (57) until backlash and pattern have be checked.

o. Install holding device (LTCT2044, replaces LTCT278) on drive shaftgear (49), and secure hold ing device to housing (43) with bolts, washers, and nuts. Using wrench (LTCT1109, replaces LTCT21 tighten spanner nut (60) as required. (Refer to tab 11-3, reference number 59.)

p. Using backlash gage (LTCT716), check for backlash between tachometer drive shaftgear (18) and upper drive shaftgear (49). Backlash measure ment should be as given in table 11-4, reference number 88.

q. Rotate shaftgears to obtain tooth pattern. R move tachometer drive shaftgear and liner assem (17), and upper drive shaftgear and liner assembl (48) and check pattern. (Refer to paragraph 8-11 and figures 8-1 and 8-2 for procedures to establi correct pattern.)

r. Correct backlash and pattern by adjusting thickness of shims (21 and 52, figure 6-3). Recheck backlash and pattern until corrected.

s. When backlash and pattern have been corre wash gears with drycleaning solvent (item 28, tab 2-2), and reinstall tachometer drive shaftgear an liner assembly (17), and upper drive shaftgear an liner assembly (48) with appropriate shims (21 an 52) as directed in preceding steps j. through n. Tighten all nuts and bolts to proper torque and be tabs on all tabwashers.

t. Lubricate liners in housing (43) with shorte compound (item 95, table 2-2). Insert overspeed governor and tachometer drive intermediate gear (36) with bearings (35 and 37) installed, and over nor drive shaftgear (41) with bearings (40) and nstalled, into housing (43). Hold intermediate to prevent turning and, using a tapered feeler , check for backlash between intermediate gear each shaftgear. Backlash measurement should s given in table 11-4, reference number 89.

Lubricate housing gasket (34) and position t on housing (43). Lubricate all holes in assembly (33). Lubricate lip of seal (32) lubricating oil (item 63 or 64, table 2-2), and, installing tool (LTCT501 or LTCT99), press into cover assembly with arbor press. Posi- cover assembly on housing and, using soft-faced t, gently tap cover assembly down. Secure assembly to housing with washers (39) and (38).

CAUTION

mproper installation of relief valve assembly in following step v., could result in damaged packings. This could cause sections of the packing to enter oil passages which would result in a low torqueeter reading.

Lubricate packings (15 and 16) with shortening ound (item 95, table 2-2), and place on relief body (14). Lubricate inside of valve body with ning compound (item 95, table 2-2) and insert (13), relief valve plunger (12), relief valve (11), and adjusting screw (10) into body. In- relief valve assembly into housing (43). Tighten quired. (Refer to table 11-3, reference number).

NOTE

In following step w., do not tighten and lock the nut (8) until after torquemeter oil pressure has been checked and adjusted.

Install tabwasher (9) and nut (8) and position ad- screw (10) so that six screw threads are above the head of the nut, and tighten nut -tight.

After engine test, tighten nut (8) as required. to table 11-3, reference number 56.) Bend against relief valve body (14) and into nut (8).

ASSEMBLY OF OVERSPEED GOVERNOR AND OMETER DRIVE ASSEMBLY (T53-L-701 En- (DS AND GS MAINTENANCE). (See figure) Proceed as follows:

Lubricate packing (25) with petrolatum (item ble 2-2) and place on plug (26). Install plug cover assembly (18). Tighten plug to 70 to -inches torque and lockwire.

Install packing (31) on filter assembly (32) cking (33) on plug (34). Insert filter assembly into housing and liner assembly. Tighten required. (Refer to table 11-3, reference r 92.)

c. Using soft-faced mallet, gently tap bearing (41) into liner (40). Using depth micrometer, measure distance from top of bearing to surface of liner flange and select a shim (42) to obtain 0.002 to 0.004 inch pinch fit on bearing.

d. Using arbor press and sleeve bushing (LTCT 68-10 or LTCT3640), press bearing (37), spacer (38), and liner (40), with bearing (41) installed, onto gearshaft assembly (36). Check for rotational freedom of gearshaft within liner. If necessary, gently tap gearshaft with soft-faced mallet to eliminate sticking.

e. Place gearshaft and liner assembly in gear assembly holder (LTCT2037 or LTCT277). Install key washer (46) and nut (47). Using socket wrench (LTCT2161 or LTCT213), tighten nut as required. (Refer to table 11-3, reference number 64.) Do not bend tabs on key washer until backlash and gear pattern have been checked.

f. Coat teeth of gearshaft assembly (36) with red lead (item 91, table 2-2).

NOTE

In following step g., shim shall correspond in thickness to shim removed during disassembly.

g. Install shim (39) on underside of liner (40).

h. Insert bearing and liner assembly (35) and plate (43) into housing and liner assembly (30). Using soft-faced mallet, gently tap liner assembly to ensure proper seating. Install tabwashers (44) and screws (45), and tighten screws as required. (Refer to table 11-3, reference number 65.) Do not bend tabs on tabwashers until backlash and gear pattern have been checked.

i. Install holding device (LTCT2044 or LTCT278) on gearshaft assembly (36) and secure to housing and liner assembly (30) with suitable bolts and washers.

j. Using soft-faced mallet, gently tap bearing (7) into liner (6). Using depth micrometer, measure distance from top of bearing to surface of liner flange and select shim (8) to obtain pinch fit on bearing as given in table 11-4, reference number 90.

k. Using arbor press and sleeve bushing (LTCT 68-10, or LTCT3640), press bearing (3), spacer (4), and liner (6), with bearing (7) installed, onto gearshaft assembly (2). Check for rotational freedom of gearshaft assembly within liner. If necessary, gently tap gearshaft assembly with a soft-faced mallet to eliminate sticking.

l. Coat teeth of gearshaft assembly (2) with iron-blue pigment (item 55, table 2-2).

NOTE

In following step m., shim shall correspond in thickness to shim removed during disassembly.

m. Install shim (5) on underside of liner (6).

n. Insert bearing and liner assembly (1), and plate (9) into housing and liner assembly (30), carefully meshing with gearshaft assembly (36). Install tabwashers (10) and screws (11) and tighten screws as required. (Refer to table 11-3, reference number 63.)

o. Insert key (15) and, mating key with keyway in gear (14), install gear. Install key washer (13) and spanner nut (12). Using socket wrench (LTCT1109 or LTCT214), tighten nut as required. (Refer to table 11-3, reference number 67.)

p. Using backlash gage (LTCT3486), with contact point of dial indicator touching scribed line of flag of gage, check backlash between gearshaft assemblies (2 and 36). Backlash measurement should be as given in table 11-4, reference number 91.

q. Remove holding device (LTCT2044 or LTCT 278) and rotate gears to obtain tooth pattern. Remove both bearing and liner assemblies (1 and 35) and check tooth pattern. (Refer to paragraph 8-11 for procedures to establish correct pattern.)

r. Correct backlash and pattern by adjusting shims (5 and 39, figure 6-4). Reassemble and recheck backlash and pattern until correct.

s. When correct backlash and pattern are established, wash gears with drycleaning solvent (item 28, table 2-2), and reinstall bearings, liner assemblies, and gears. Tighten all nuts and screws to proper torque and bend tabs on all tabwashers.

t. Lubricate bearing liners in housing with shortening compound (item 95, table 2-2). Insert gear (21) with bearings (22 and 20) installed. Insert gearshaft (28) with bearings (29 and 27) installed. Hold gear (21) stationary and, using tapered feeler gage, check backlash between gear and each gearshaft. Backlash measurement should be as given in table 11-4, reference number 92.

u. Position gasket (19) on housing and liner assembly (30).

v. Lubricate lip of seal (17) with lubricating oil (item 63 or 64, table 2-2) and, using seal installation tool (LTCT501), press seal into cover assembly (18).

w. Position cover and seal assembly (16) on housing and liner assembly (30) and, using soft-faced mallet, gently tap cover and seal assembly down until firmly seated. Secure with bolts (23) a washers (24). Tighten bolts as required. (Refer to table 11-3, reference number 66.)

8-84. **PRESSURE TEST OF OVERSPEED GOVER AND TACHOMETER DRIVE ASSEMBLY.** Pressu test overspeed governor and tachometer drive assembly as follows.

NOTE

Following steps a. and b. apply to T53-L-7/7A/15 engines only.

a. Install packing (44, figure 6-3) on power-dr rotary (booster) pump (45).

b. Position pump on overspeed governor and tachometer drive assembly, and secure with bolt (47) and washers (46).

c. Remove plug (62, figure 6-3, or plug 26, fi ure 6-4) and install suitable line fitting into housi and liner assembly.

d. Install holding device (LTCT2044) onto over speed governor and tachometer drive assembly, secure with suitable bolts, washers, and nuts.

e. Install suitable plug into overspeed governo drive port.

f. Connect clean, dry air supply to line fitting Air supply shall be equipped with regulator to lim pressure to 8 to 12 psig.

g. Apply lubricating oil (item 63 or 64, table or leak test solution (item 57, table 2-2), to all and mating surfaces.

h. Check for leakage. If leakage is apparent, pair by lapping mating surface of cover assembl figure 6-3, or 18, figure 6-4), or by replacing se

i. After completing pressure test, remove ho fixture, line fitting, plug, and pump.

j. After completion of pressure test, place p (63, figure 6-3, or 25, figure 6-4) on plug (62, f 6-3, or 26, figure 6-4) and install plug in housin liner assembly (43, figure 6-3, or 30, figure 6- Tighten plug as required. (Refer to table 11-3, r erence numbers 76 and 92.) Lockwire plug.

CHAPTER 9

FINAL ENGINE ASSEMBLY

1. GENERAL.

1. This section contains instructions for assem-
parts and subassemblies together to make a
plete engine.

1. LUBRICANTS AND SEALING COMPOUNDS.

4. Refer to Chapter 5, paragraph 5-4.

1. LOCKWIRING.

4. Refer to Chapter 5, paragraph 5-6.

1. TORQUE VALUES.

4. When no special torque values are given in a
embly procedure, standard torque values shall
y. Standard torque values are specified in table
1.

1. DIMENSIONAL LIMITS.

0. Refer to Chapter 11, Section II.

1. MARKING ON MATERIALS SUBJECT TO HIGH
PERATURES.

2. Refer to Chapter 3, Section II.

3. INSTALLATION OF ENGINE SUBASSEMBLIES.

4. COMPRESSOR ROTOR AND CENTRIFUGAL
ELLER CLEARANCE CHECKS. Proceed as
ws:

a. Remove upper halves of compressor and impel-
housings if installed. (Refer to paragraph 3-57.)

NOTE

When taking tip clearances, insert feeler
gage 1/4 to 1/2 inch below the compres-
sor housing flange line.

Using 12-inch feeler gage take all radial axial,
circumferential clearances at two points, 180
es apart. (See figures 9-1 through 9-3.)

Rotate compressor rotor one full turn while
clearance readings.

Clearances shall be as given in table 11-4,
nces 10 through 31 or 32 through 48.

Using height gage equipped with dial indicator,
compressor rotor runout limits. (See figure
) If limits given in table 11-4 are exceeded,
engine to depot for corrective action.

Figure 9-1. Checking Radial Clearance Between Compressor Rotor Blades and Compressor Housing (Typical)

f. If compressor rotor and centrifugal compressor impeller clearances are within specified limits and no further repair is required to engine, compressor and impeller housings may be reinstalled.

9-15. (Deleted)

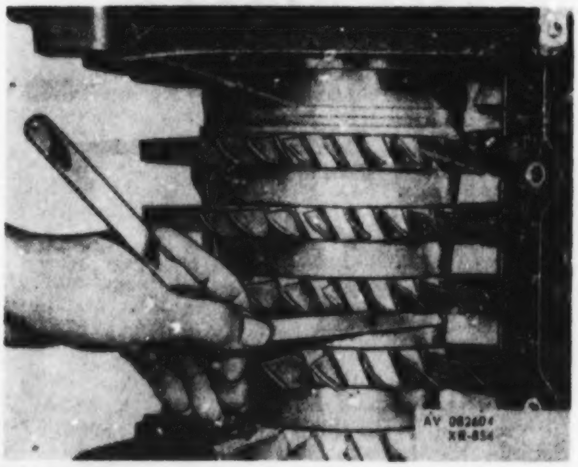


Figure 9-2. Checking Radial Clearance Between Compressor Vane and Compressor Rotor Spacer (Typical)

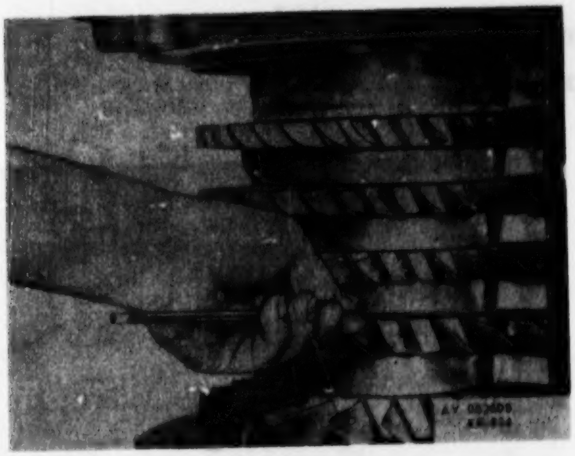


Figure 9-3. Checking Axial Clearance Between Compressor Rotor Blades and Compressor Rotor Vanes (Typical)

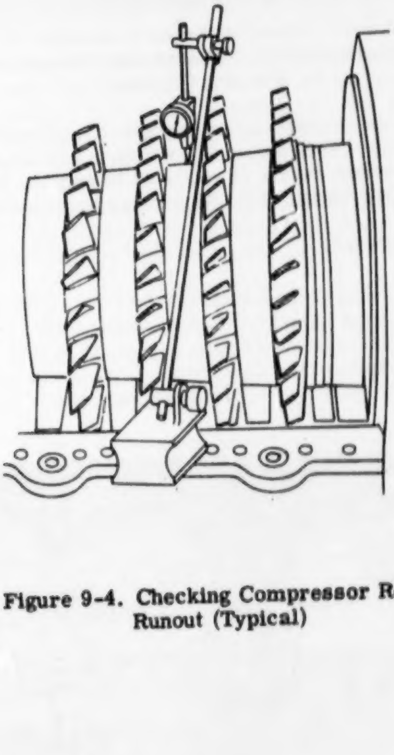


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Figure 9-4. Checking Compressor Rotor Runout (Typical)

9-16. INSTALLATION OF COMPRESSOR AND IMPELLER HOUSING ASSEMBLIES. (See figure 3-4

NOTE

> On T53-L-15/701 engines, when impeller housings 1-100-090-08 or 1-100-090-09 are not available for use, housings 1-100-090-06 or 1-100-090-07 which are new or in excellent condition (not shimmed or recontoured) may be used. When impeller housings 1-100-010-06 or 1-100-090-07 are used the axially threaded hole in the lower housing located at the 8-o'clock position as viewed from the front face must be plugged with selflocking setscrew, MS18063-14, installed flush.

a. Install impeller housing assembly.

b. Using vernier depth gage, ensure that gap as given in table 11-4, reference number 42, will exi between shroud ends of mating vane assemblies af compressor housing installation. File shroud end as required, to obtain clearance and install compressor housing.

c. Install threaded tapered pins (18, figure 3-4 or dowels (20) in compressor and impeller housin flanges. Install bolts (6) and washers (7) that secu compressor housing to inlet housing.

d. Position clips for airbleed band on proper bolts. Install bolts (5) and washers (4) that secur compressor housing assembly (8) to impeller hou assembly (1). Tighten bolts to proper torque and lockwire.

On all models except T53-L-701, install bolts nd washers (2) that secure impeller housing to er housing. Tighten bolts to proper torque, lockwire

NOTE

In following step f., position flange of bushing (24) toward flange of impeller housing.

Position bracket for ignition unit on three bolts (3) at approximately the 10-o'clock position.

On model T53-L-701 engines, install six bush- (24) six bolts (25), six washers (2) and six bolts at secure impeller housing assembly to diffuser g assembly. (See figure 9-5.) Tighten bolts igure 3-41) as required. (Refer to table 11-3, ence number 95.) Lockwire bolts. Tighten bolts proper torque and lockwire.

NOTE

Following step g. applies to housing with tapered pins.

g. Install washers (17, figure 3-41) and nuts (16) on threaded tapered pins (18). Tighten nuts as required. (Refer to table 11-3, reference number 19). Install remaining bolts and nuts that secure upper and lower halves of compressor housing. Tighten and lockwire all bolts.

NOTE

Following step h. applies to housings with hollow dowels (20, figure 3-41).

h. Install bolts (21), washers (19), and nuts (15). Tighten nuts as required. (Refer to table 11-3, reference number 18.) Install remaining bolts and nuts on compressor housing. Tighten and lockwire all bolts.

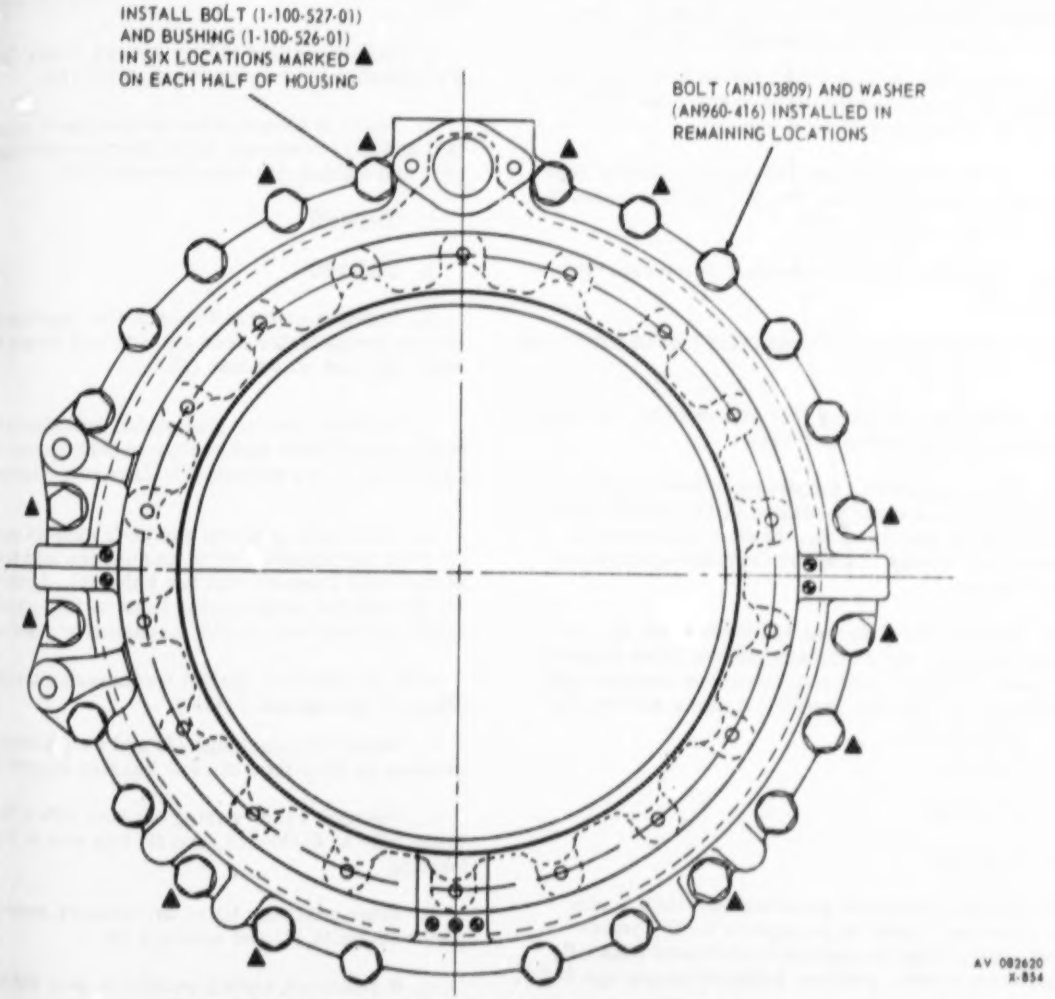
INSTALL BOLT (1-100-527-01) AND BUSHING (1-100-526-01) IN SIX LOCATIONS MARKED ▲ ON EACH HALF OF HOUSING
BOLT (AN103809) AND WASHER (AN960-416) INSTALLED IN REMAINING LOCATIONS
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Figure 9-5. Impeller Housing Bolt Locations (T53-L-701)

i. Ensure that all removed brackets have been reinstalled, and install all removed lines, hoses, and accessories.

9-17. INSTALLATION OF REAR BEARING SUPPORT ASSEMBLY (T53-L-7/7A/15 Engines).

(See figure 3-38.) Proceed as follows:

a. Lubricate packing (2 and 3) using shortening compound (item 95, table 2-2), and install in two counterbores on forward face of accessory drive carrier assembly. Lubricate and install one packing (4) in counterbore on rear face of propeller shaft rear bearing support assembly (1).

b. Install rear bearing support and secure with 12 bolts (6) and washers (5). Tighten bolts. (Refer to table 11-3, reference number 7.) Lockwire bolts.

c. Install sun gearshaft and reduction gear assembly. (Refer to paragraph 9-19.)

9-18. INSTALLATION OF REAR BEARING SUPPORT ASSEMBLY, SUN GEAR SUPPORT ASSEMBLY, TORQUEMETER HEAD ASSEMBLY, TORQUEMETER HEAD SUPPORT, AND ACCESSORY DRIVE CARRIER ASSEMBLY (T53-L-701 Engine).

(See figure 3-40 and 3-40A.) Proceed as follows:

a. Install two packings (19, figure 3-40) and one packing (20) in accessory drive carrier assembly mating mounting face of inlet housing.

aA. Install two packings (22) on oil transfer tube (21) and insert tube in opening in rear of accessory drive carrier assembly (18).

aB. Carefully install accessory drive carrier assembly (18).

aC. Install packing (27) and plate (26) on inlet housing.

b. Install two packings (12) on connector sleeve of torquemeter head assembly (11).

c. While supporting torquemeter head, insert connector sleeve using installer (LTCT13685) into its opening in inlet housing. Ensure connector is inserted far enough to expose lockplate grooves at outer opening.

d. Position torquemeter lockplates (25) in connector grooves, with retaining screw holes aligned, and push lockplates and connector into opening until lockplates are seated. Install retaining screws (23) with washers (24).

e. (Deleted)

eA. (Deleted)

eB. (Deleted)

eC. Install overspeed governor and tachometer drive assembly (refer to paragraph 9-30), power takeoff shaft (refer to applicable airframe manual), and accessory drive gearbox (refer to paragraph 9-28).

eD. Position retaining ring (3, figure 3-40A), on power shaft.

WARNING

In following step eE., to prevent injury to operator, asbestos gloves must be worn.

eE. Place spur gear (2) into installation tool (LTCT13102) and heat in oven for 30 minutes at 300 to 400°F. Remove gear from oven and quickly install on power shaft spline, seating it firmly ove retaining ring. Power shaft must be pushed forw from aft end of engine.

eF. Install new packing (1) into internal groove spur gear.

eG. After installation of gear (2), measure fro forward face of power shaft to the inner flange of gear. Dimension shall be as given in table 11-4, reference number 10A.

f. Install two packings (16, figure 3-40) and o packing (17) in grooves of accessory drive carrie face.

g. Install packing (15) in groove in rear face o torquemeter head support assembly (14).

h. Position torquemeter head support assembl (14) against accessory drive carrier assembly. I sert and tighten flat-head screws (13).

i. (Deleted)

j. (Deleted)

k. Position electric torquemeter head assemb (11) on torquemeter head support and secure with bolts (10) and tabwasher (10A).

l. Position retaining strap (9) over torquemet head cable-sleeve and secure to torquemeter hea support with two screws (8). Lockwire screws.

m. Carefully position sun gear support assem (7) over torquemeter head and secure tabs to tor meter head support with two bolts (6). Lockwire (6) around the torquemeter head on the opposite from the lead wire to the torquemeter junction b

mA. If removed, install torquemeter junction (Refer to paragraph 5-128.)

n. Install two packings (4) and two packings (grooves in rear face of rear bearing support (3).

o. Position rear bearing support with 5/16-in drain hole at 6-o'clock, and fit into seat in inlet housing.

p. After ensuring holes are aligned, secure s port with bolts (1) and washers (2).

q. If removed, install reduction gear and sun gearshaft (refer to paragraph 9-20).

9. INSTALLATION OF REDUCTION GEAR SEMBLY, SUN GEARSHAFT, AND TOR- EMETER VALVE AND CYLINDER (T53-L- 7A/15 Engines).

a. Install torquemeter cylinder (4, figure 3-35) in- inlet housing and secure with bolts (3). Lockwire lts.

b. Place shim (2) on torquemeter valve (1) and, ng installer and remover (LTCT519) or socket, erably 6-point) install valve and shim into inder. Tighten valve as required. (Refer to table 3, reference number 13.)

c. Using depth micrometer, or depth gage, sure distance (dimension A, figure 9-6) from ard end of inlet housing to torquemeter valve ger and distance (dimension B) from forward d of inlet housing to inner flange of torquemeter nder.

d. Subtract dimension A from dimension B to in dimension C.

NOTE

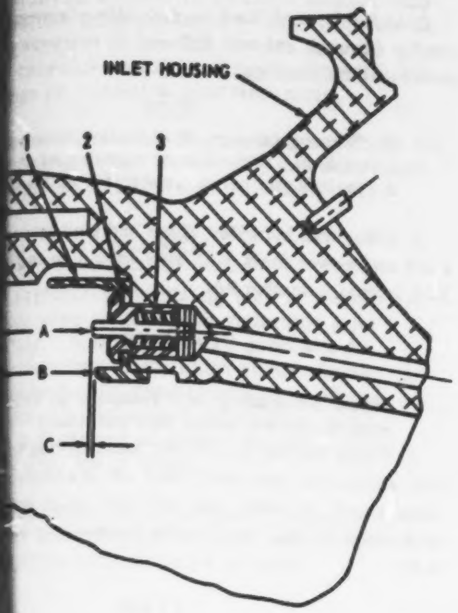
Dimension C shall be as given in table 11-4, reference number 3. If this dimension is not within limits, remove torquemeter valve, add or remove shims as required, reinstall valve, and lockwire.

The following steps e. through i., apply to T53-L-7/7A engines.

e. Check to ensure that plug is installed in forward end of power shaft.

f. Heat sun gear sealing cup (7, figure 3-33) for 1/2 hour at temperature of 300 to 400°F.

g. Install power shaft sleeve retainer (8) in groove on power shaft and push power shaft aft.



meter Cylinder 3. Torquemeter Valve

e 9-6. Torquemeter Valve Location and djustment Diagram (T53-L-7/7A/15)

cup installing tool (LTCT525), quickly on power shaft, seating it firmly against

depth micrometer, measure from for- power shaft to inside of sealing cup. imension shall be as given in table 11-4, umber 7. If dimension is less than install new cup.

packing (5, figure 3-33) on OD of spur r shaft.

un gearshaft (4) onto power shaft assem- that splines mesh properly. Press end haft over packing (5).

NOTE

owing step l., ensure that convex r (1-030-138-04) is installed. En- at the conical surface of the washer he forward end of the engine.

convex washer (3) through sun gearshaft r shaft.

NOTE

In following step m., do not lubricate retainer bolt (1).

CAUTION

In following step m., ensure that the tangs of the bolt retainer engage the slots in the power shaft.

m. Using guide (LTCT4602), install bolt retainer (2) through sun gearshaft onto power shaft. Secure bolt retainer (2) and convex washer (3) to power shaft with retainer bolt (1).

n. Position sungear holding fixture (LTCT2075) on studs of inlet housing with splines meshed with sun gearshaft teeth. Secure with four nuts.

o. (Deleted)

p. Using wrench (LTCT258), tighten retainer bolt as required. (Refer to table 11-3, reference number 3.) Do not lock retainer bolt at this time.

q. Apply forward load on rear side of power turbine assembly (through exhaust diffuser) to overcome end float of power turbine bearings.

NOTE

In following step r., if end play exceeds established limits, recheck tang engagement or install a new bolt retainer or washer. Recheck end play.

r. Using dial indicator, check end play between sun gearshaft and power shaft. End play should be as given in table 11-4, reference number 9A.

CAUTION

When deforming bolt retainer in following step s., do not shear bolt retainer.

s. Using tool set (LTCT509), hand-tighten tool center rod into engine sun gear bolt, back off one-quarter turn, insert allen wrench in center rod and hold. Align and engage tool tabs in slot in bolt and turn handle clockwise to deform retainer tabs.

NOTE

All corners of sealing rings must be sharp and free from burrs.

t. Attach lifting adapter (LTCT181) and suitable hoist to reduction gear assembly. (See figure 3-32.)

CAUTION

When performing following step u., do not damage the threads of inlet housing studs. Apply downward pressure on bar of sling clamp to maintain horizontal position. Ensure that the serol shaftgear and accessory drive carrier shaftgears are properly engaged.

u. Carefully guide reduction gear assembly over inlet housing studs and into inlet housing.

v. Secure reduction gear assembly with nuts (2, figure 3031) and washers (3). Do not use lubricant on nuts (2). Tighten nuts as required. (Refer to able 11-3, reference number 4).

w. Using socket, P/N SWE8673L, anchor plate, P/N SWE8473-1W, and power wrench, P/N SWE8100, tighten thrust nut (1) as required. (Refer to table 11-3, reference number 1). (See figure 3-30.)

9-20. INSTALLATION OF REDUCTION GEAR ASSEMBLY AND SUN GEARSHAFT. (T53-L-701 Engine).

Proceed as follows:

a. Carefully insert sun gearshaft (4, figure 3-37) through sun gearshaft support assembly (5) and torquemeter head (6). Continue careful insertion, rotating sun gearshaft to engage splines of power shaft (9) pressing past packing (7) until seated against counterbored face in spur gear (8).

NOTE

In following step b., ensure that convex washer (1-030-138-04) is installed. Ensure that the conical surface of the washer faces the forward end of the engine.

b. Insert convex washer (3) through sun gearshaft (4) onto power shaft.

CAUTION

In following step c., ensure that the tangs of the bolt retainer engage the slots in the power shaft.

NOTE

In following step c., do not lubricate retainer bolt (1).

c. Using guide (LTCT4602), install bolt retainer (2) through sun gearshaft onto power shaft. Secure bolt retainer (2) and convex washer (3) to power shaft with reatiner bolt (1).

d. Position sun gear holding fixture (LTCT6985) on studs of inlet housing with splines meshed with sun gearshaft teeth. Secure with four nuts.

e. Using driver wrenceh (LTCT258), tighten retainer bolt as required. (Refer to table 11-3, reference number 14.) Do not lock retainer bolt at this time.

f. Apply forward load on rear side of power turbi sembly (through exhaust diffuser) to overcome end f power turbine bearings.

NOTE

In following step g., if end play exceeds established limits, recheck tang engagement or install a new bolt retainer or washer. Recheck end play.

g. Using dial indicator, check end play between sun shaft and power shaft. End play should be as given in 11-4, reference number 9A.

CAUTION

When deforming bolt retainer in followin step h., do not shear bolt retainer.

h. Using tool set (LTCT509), hand-tighten tool cent into engine sun gear bolt, back off one-quarter turn, allen wrench in center rod and hold. Align and engag tabs inslot in bolt, turn handle clockwise to deform r tabs.

CAUTION

If bearing inner race (8, figure 3-36) was removed, reinstall in accordance with steps j. through m. If a new bearing inner race is to be installed, the matching outer race (4, figure 6-27) must also be replace. (Refer to paragraph 9-18.)

i. Using a suitable fiber drift, drive inner race (8, fi 36) onto rear of propeller shaft. Ensure that forward race is firmly seated.

j. Install locking cup (9) and nut (10).

k. Using handle (LTCT2019 or LTCT182) secure p shaft, and using wrench (LTCT6605) tighten nut (10) quired. (Refer to table 11-3, reference number 17.)

CAUTION

When deforming locking cup in followin step 1., do not shear locking cup.

l. Deform locking cup into slots of nut.

m. Install packing (4, figure 3-36) on reduction sembly (3).

n. Carefully mesh gears and install secondary ca sembly (5). Ensure that all mating holes are aligned.

o. Secure secondary carrier assembly (5) to reducti assembly with screws (6).

Attach lifting adapter (LTCT181) and suitable to reduction gear assembly. (See figure 3-32.)

Lubricate and install packing (7, figure 3-36) ar flange or reduction gear assembly.

Lubricate and install four packings (7B and 12) oil transfer tubes (7A and 11) and seat tubes ings in rear of reduction gear assembly.

CAUTION

When performing following step s., use xtreme care in installing reduction gear ssembly. Apply downward pressure on ling clamp bar to maintain vertical alignment of reduction gear assembly. Align nit squarely and insert carefully. After nitial engagement of studs, ensure square- ess of final entry stage.

Carefully guide reduction gear assembly over rshaft, sun gearshaft support assembly, and using studs and into inlet housing.

NOTE

When performing following step t., do not lubricate nuts (1).

When unit is properly seated, secure reduction ssembly with washers (2) and nuts (1). Tighten s required. (Refer to table 11-3, reference r 15.)

INSTALLATION OF AIR DEFLECTOR, FIRST TURBINE NOZZLE AND FLANGE ASSEM- COMBUSTION CHAMBER DEFLECTOR, REAR NG SEAL, AND SEAL HOUSING (T53-L-7/7A). Proceed as follows.

CAUTION

hen performing step (a), do not tap ner (1, figure 3-23) to install.

liner (1) and cone (2) have been removed, en- t impeller is in place and install liner on rear sor shaft.

CAUTION

performing following step b., ensure t cone is not cocked during installation. eck alignment of liner with impeller.

ition cone with beveled edge facing aft on pressor shaft. Using cone inserting tool 13 or LTCT510), install cone onto shaft oned.

CAUTION

performing following step c., ensure t liners of seal (6) and seal housing (5) are free from burrs and varnish buildup. Ensure that graphite sealing rings are not damaged. Graphite rings in seal must be kept dry during assembly.

NOTE

If new shim or seal housing is to be installed, determine shim thickness (dimension B) as recorded in paragraph 3-49, step g.

c. Using arbor press, press rear bearing seal (6) into seal housing (5), and install snapring (7). Install shim (3) over seal housing. Install packing (4) on seal housing.

d. Position seal (6), housing (5), and shim (3) over liner and push seal and housing, as far as possible, forward into rear bearing housing assembly. Align bolt holes in seal housing with bolt holes in rear bearing housing assembly.

e. Position combustion chamber deflector (8) on compressor rear bearing housing assembly and align holes in deflector with holes in rear bearing housing assembly.

f. Select a laminated shim the same thickness as that recorded during removal. (Refer to paragraph 3-49 step d.)

g. Position shim (9) against combustion chamber deflector. Align holes in shim with holes in deflector.

h. Position first stage turbine nozzle assembly (11) on shim.

i. Position air deflector (15) on nozzle assembly, with the dished portion up.

j. Align holes of first stage turbine nozzle and deflector with holes in shim and combustion chamber deflector.

NOTE

In following step k., always use new bolts (16) for reassembly.

k. Secure shim, nozzle, air deflector, and combustion chamber deflector to compressor rear bearing housing assembly with bolts (16). Tighten bolts as required. (Refer to table 11-3, reference number 20.)

l. Determine gap as given in table 11-4, reference number 54, between first stage turbine nozzle flange and second stage nozzle as follows.

(1) Measure shim (B, figure 8-41) from diffuser flange face to first stage nozzle flange rear face. (See figure 7-25.) Record distance at four 90-degree positions for an average dimension.

NOTE

In following step (2), take measurements from completely assembled combustion chamber assembly only.

(2) Measure dimension (A, figure 8-41) from combustor flange face to second stage nozzle. Record distance at four 90-degree positions for average dimensions.

(3) Subtract average dimension in preceding step (1) from average dimension in preceding step (2). The difference (C) must be as given in table 11-4, reference number 54.

NOTE

The laminated shim is 0.070 inch thick with 0.002 inch laminations.

m. Remove from, or add to, shim under first stage nozzle to obtain required gap.

n. Position shim of correct thickness on combustion chamber deflector and repeat preceding steps h. through k.

o. After establishing gap and tightening bolts, lockwire bolts that secure nozzle and deflector to compressor rear bearing housing.

9-22. INSTALLATION OF FIRST STAGE TURBINE ROTOR ASSEMBLY (T53-L-7/7A Engines). Proceed as follows.

NOTE

The gap between first stage and second stage nozzles must be established before installing first stage turbine rotor. (Refer to steps l. and m., paragraph 9-21.)

a. Lubricate splines of rear compressor shaft and first stage turbine rotor (1, figure 3-21) with molybdenum disulfide powder (item 76, table 2-2).

CAUTION

Check that forward compressor cone is in proper position on rear compressor shaft (with beveled edge facing aft). If necessary, reposition cone, using installation tool (LTCT4013).

b. Inspect forward compressor cone for marks or abrasions. Wipe cone clean with lint-free cloth.

NOTE

In following step c. ensure that match marks on turbine rotor and shaft are aligned.

c. Position turbine rotor, with forward face t ward front of engine, on rear compressor shaft, meshing splines of shaft with internal splines of bine.

d. Inspect face of compressor turbine rear co (2), figure 3-21) for marks or abrasions. Wipe c clean with lint-free cloth.

e. Install cone on rear compressor shaft and against turbine wheel.

eA. Apply Molykote antiseize thread compoun (item 78, table 2-2) or Ease-Off 990 (item 32, t 2-2) to nut (4).

f. Install compressor shaft rear bearing lock (3) and first stage turbine bearing retaining span nut (4) on compressor shaft.

NOTE

Refer to table 3-4 for tools necessary to install spanner nut lockring and cone in following steps g. through j.

g. Position and secure holding fixture to diffu housing.

h. Install applicable wrench socket into corre ponding holding fixture. Engage wrench tangs wi slots in retaining spanner nut.

i. Tighten nut. (Refer to table 11-3, referen number 35.)

j. Remove wrench socket and holding fixture.

NOTE

An alternate method to preceding steps g. through j. is shown in following steps jA. through jC.

Refer to table 3-4 for tools necessary to install spanner nut, lockring, and cone in following steps jA. through jC.

jA. Position and secure torque fixture to firs stage turbine rotor rear hub.

jB. Install wrench socket into torque fixture, gaging tangs of wrench socket with slots in retai spanner nut (4, figure 3-21).

jC. Using power wrench, tighten nut. (Refer table 11-3, reference number 35.) Remove tor wrench and torque fixture from first stage turbi rotor rear hub.

k. Using suitable wire, 0.080 inch thick and b 90 degrees at one end, check for minimum clear as given in table 11-4, reference number 52 (E, figure 8-41) between first stage turbine rim for face and first stage turbine nozzle. Rotate whee 360 degrees. If minimum clearance cannot be o tained, peel off required amount of laminated sh figure 3-23) under nozzle.

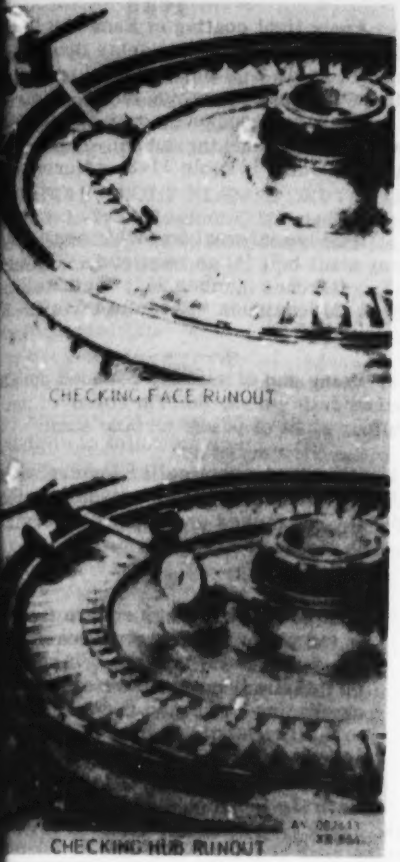
NOTE

When adjusting shim, ensure that gap as given in table 11-4, reference number 34, between first stage turbine nozzle flange and second stage nozzle is retained. If gap becomes too great, replace nozzle and ship to depot for disposition.

If engine is in maintenance stand, position engine in approximately 45-degree nose down attitude prior to performing step l.

l. Using dial indicator, check turbine disc face runout on rim at point just inboard of blade roots and runout on hub of disc immediately forward of hub lip. Runout should be as given in table 11-4, reference number 36. (See figure 9-7 for methods of checking runout.)

m. If either runout limit is exceeded, remove first stage turbine rotor and clean cones, cone seats in turbine rotor, and cone seats on rear compressor shaft, using clean lint-free cloth. Reinstall turbine rotor 180° from its original position and recheck hub and rim runouts.



gure 9-7. Checking First Stage
Turbine Runout (T53-L-7/7A)

uts are within limits, proceed to follow-
f the runouts are not within limits, re-
t stage turbine rotor, reposition it 180
inal position and repeat the runout

runout limits are still exceeded, try
the turbine rotor at 90° and/or 270°
inal position.

mits are still exceeded at these posi-
e the forward and rear cones, reinstall
tor and recheck runouts.

runouts still exceed the limits, remove
tor and using a dial indicator check the
outer diameter of the compressor rear
ear cone seat area which must be within
f 0.002 inch T.I.R.

runout on the rear compressor shaft is
ximum limit, replace the first stage
. Recheck runouts on the replacement

p. If the rear compressor shaft runout on the rear cone seat journal exceeds the maximum limit of 0.002 inch and if the turbine rotor hub and rim runouts exceed the limits, return the engine to depot for further checking and disposition.

q. If hub and rim runouts are within limits, check clearances between first stage turbine blade tips and turbine nozzle flange. (Refer to paragraph 3-47.)

r. Secure nut before deforming lockring into slots of nut at two places, 180 degrees apart.

s. Install combustor turbine assembly. (Refer to paragraph 9-23.)

9-23. INSTALLATION OF COMBUSTOR TURBINE ASSEMBLY (T53-L-7/7A Engines). Proceed as follows.

CAUTION

Before installing combustor turbine assembly, ensure that spring-loaded asbestos power turbine cylinder sealing ring (1, figure 6-12) in seal retainer (4) is firmly seated and that the 12 lockwires (9) that secure it are in position.

NOTE

Ensure that a gap of 0.030 to 0.070 inch (C, figure 8-41) between the first stage turbine nozzle flange and the second stage nozzle is obtained before installing the combustor turbine assembly. Shim as necessary to obtain or maintain the specified gap. (Refer to step 1., paragraph 9-21.)

a. Install power shaft bolt (4, figure 3-15) into power shaft. Finger-tighten to check for cleanliness and condition of threads. If any tightness or failure of shoulder to bottom on power shaft exists, clean or repair threads. (Refer to paragraph 7-138).

aA. Clean power shaft aft splines and internal splines in power turbine.

b. Position mating marks as recorded when combustor turbine was removed.

NOTE

In following step c., if mating marks were not recorded during combustor turbine removal or if a new combustor section or a new power turbine rotor is installed, position the mating marks 180 degrees apart during installation.

c. If no marks were recorded, proceed as follows.

(1) Check position of mating mark center-punched on face of male spline of the power shaft. Using marking pencil (yellow) No. 2107 (item 125, table 2-2), mark position on face of first stage turbine rotor.

NOTE

In following step (2), overhauled power turbine rotors may have splines centerpunched two or more times, depending on the number of times the wheel has been rebladed. Use the mating mark with the greatest number of centerpunch marks.

(2) Check position of mating mark centerpunched on face of female spline in power turbine rotor. Using an approved marker, mark position on outside diameter of shaft.

CAUTION

If combustor turbine assembly or major subassembly has been replaced, it is necessary to establish a new power shaft bolt flange depth. Compare original and new flange depth measurements. (Refer to paragraph 3-45.) If they differ by more than 0.010 inch, change thickness shims to maintain original flange depth measurement. (See figure 3-15.) A maximum of three shims may be installed. If original measurements cannot be determined, refer to paragraph 9-24.

Ensure shims are flat against shoulder within rotor shaft before installing power shaft bolt. Shims may be held in place with shortening compound (item 95, table 2-2).

d. Select suitable lifting device from table 3-3. Install lifting device on combustor turbine assembly and attach to a suitable hoist. Install combustor turbine assembly on engine with drain valve located in the 6-o'clock position.

NOTE

In following step e., install bolts with their heads facing aft. Install all brackets and bypass fuel filter in proper location as recorded during removal.

e. Using wrench (LTCT393), install bolts (2, figure 3-15) and nuts (1) securing combustor turbine assembly to diffuser housing flange.

f. Install power turbine locking plate assembly (LTCT248).

NOTE

In following step g., apply Ease-Off 990 (item 32, table 2-2) or Molykote antiseize thread compound (item 78, table 2-2) to bolt (4) prior to installation.

g. Install power shaft bolt (4) and adjust its position with shim thickness as recorded during removal and corrected in the preceding Caution in step (2).

h. Using socket wrench (LTCT506), tighten power shaft bolt as required. (Refer to table 11-3, reference number 29.)

i. Apply light coating of Ease-Off 990 (item 32, table 2-2) or Molykote antiseize thread compound (item 78, table 2-2) to threads of power turbine sh and new internal wrenching nut (5, figure 3-15). U ing face spanner socket wrench (LTCT505), install new internal wrenching nut (5). Tighten nut as required. (Refer to table 11-3, reference number 28.)

j. Remove internal wrenching nut and retighten power shaft bolt (4) as required. (Refer to table 11-3, reference number 28.) Reinstall nut and tighten as required. (Refer to table 11-3, reference number 28.)

k. Using end of suitably rounded punch or side tapered drift punch, deform collar of nut to extend into four slots of power turbine shaft.

l. Visually inspect collar for cracks or weakne that may have occurred as a result of deformation If the nut is cracked or appears unserviceable, it must be replaced.

NOTE

In following step m., ensure that the groove in the power turbine rear bearing cover (8, figure 3-15) is clean. If seal (7) is to be installed, coat groove of cover with shortening compound (item 95, table 2-2) to facilitate holding seal in cover during assembly.

m. Remove locking plate assembly (LTCT248). Install seal (7) or packing (6) in groove of power turbine rear bearing cover (8).

NOTE

In following step n., prior to installation of bolts (9), apply a light coat of Ease-Off 990 (item 32, table 2-2) or Molykote antiseize thread compound (item 78, table 2-2) to threads of bolts.

n. Install power turbine rear bearing cover (8 and secure with bolts (9). Tighten bolts as requi (Refer to table 11-3, reference number 30.) Lo bolts.

NOTE

In following step o., prior to installation, apply Molykote antiseize thread compound (item 78, table 2-2) or Ease-Off 990 (item 32, table 2-2) to threads of bolts (11).

o. Install exhaust diffuser cover (10, figure 3 Secure with bolts (11); then lockwire.

p. Install ignition lead and coil assembly and haust thermocouple harness. Connect fuel, oil, electrical lines as necessary. Tighten ignition as required. (Refer to table 11-3, reference nu 87.)

NOTE

Perform an engine vibration test upon reinstallation of combustor turbine assembly (hot end), or whenever excessive engine vibration is suspected. (Refer to paragraph 10-16.)

1. POWER SHAFT BOLT FLANGE DEPTH MEA-
MENT (T53-L-7/7A Engines). If original flange
measurements have been lost, determine flange
measurement as follows.

a. If installed, remove power shaft bolt (4, figure
) and locating shim (3).

CAUTION

If power shaft is not in extreme forward position in following step b., engine failure can result.

b. Using a clean rod (wood or phenolic dowel), gently but firmly push power shaft to extreme forward position.

c. Place locating button bar (LTCT153) across back of exhaust diffuser and note dimension from bar to aft end of power shaft. This is dimension A. (See figure 9-7A.)

d. With bar in the same position, note dimension from bar to power shaft bolt seating shoulder in power turbine wheel. This is dimension B.

e. Subtract dimension B from dimension A to obtain dimension C.

f. Subtract 0.230 inch from dimension C to obtain dimension D.

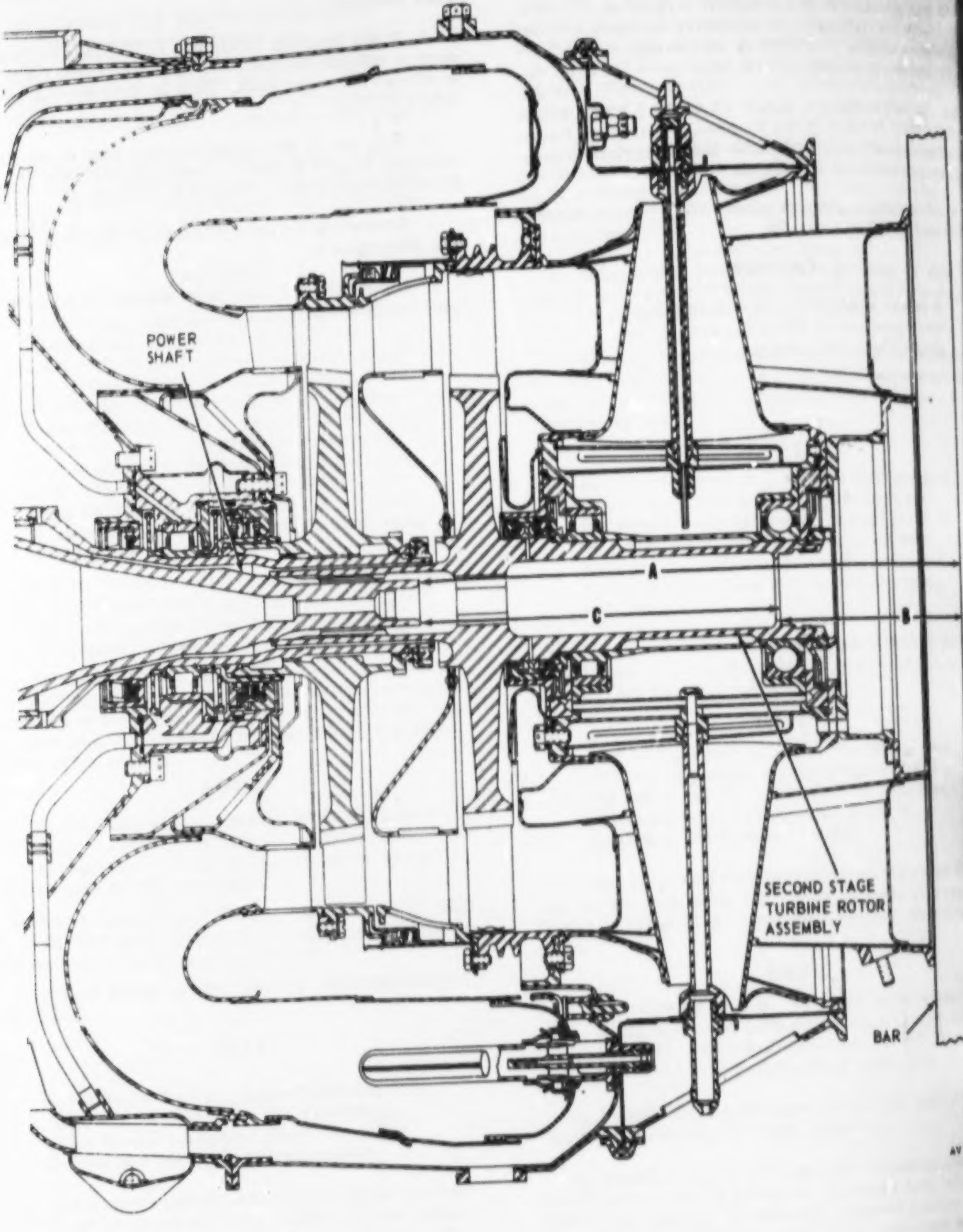

POWER
SHAFT
A
C
B
SECOND STAGE
TURBINE ROTOR
ASSEMBLY
BAR
AV

Figure 9-7A. Measuring Power Shaft Bolt Flange Depth (T53-L-7/7A)

btract dimension "D" from the power shaft gth (7.290 inches) to obtain the required s of shim.

STALLATION OF GAS PRODUCER SYSTEM NENTS (T53-L-15/701 Engines). (See figure) Proceed as follows:

NOTE

ft Seal (1-300-174-02 and -03) (26) s manufactured with a fracture at e of the slot locations on the air ide carbon element. The fracture is ot a defect and is not considered ause for seal replacement. Forward eals (1-300-173-02 and -03) (4) and ft seals (1-300-174-02 and -03) (26) re manufactured with 3 splits, 120 egrees apart on the oil side carbon lement. These splits are not defects nd are not considered cause for seal eplacement.

n T53-L-15 or-701 engines, install orward seal, 1-300-173-02 or 1-300-173-03. Install aft seal, 1-300-174- or 1-300-174-03.

o prevent tool rotation during installation, ngage tang of installing tool (LTCT13070) ith cutouts in seal (1).

arefully position forward seal (1) on forward (2) and, using installing tool (LTCT13070), eal and ring as a unit on rear compressor nsure top marking on seal is located at 12- position. (See figure 9-8 for proper seal in-.)

stall spacer (3, sheet 1), and retaining ring

ing installing tool LTCT791), install bear- race and rollers (5) on compressor rear

CAUTION

en performing following step d., en- re oil holes in bearing outer race (10) e up with oil passages in rear bearing sing assembly (7) with oil holes for-rd.

ing arbor press and suitable sleeve, press ter race (10) into rear bearing housing (7).

e. Install seal (6) and packings (17 and 18) in groves of diffuser housing assembly. (Refer to paragraph 7-172 for replacement of aft seal).

NOTE

Prior to stud installation in following step f., apply Ease-Off lubricant (item 32, table 2-2) or Molykote antiseize thread compound (item 78, table 2-2) to threads.

f. Position rear bearing housing assembly (7) over rear compressor shaft. Install six bolts (20) washers (19) and tighten bolts. (Refer to table 11-3, reference number 36.) Install two new stepped studs (9) or studs (8) into the two counterbored holes located at the 12- and 6-o'clock positions.

g. Using wrench (LTCT1409) mounted at 90-degree angle with torque wrench, tighten stepped studs (9). (Refer to table 11-3, reference number 50.) Using a special wrench (LTCT6940) on four large flats of stud (8), tighten studs (8). (Refer to table 11-3, reference number 50.) Do not lockwire at this time.

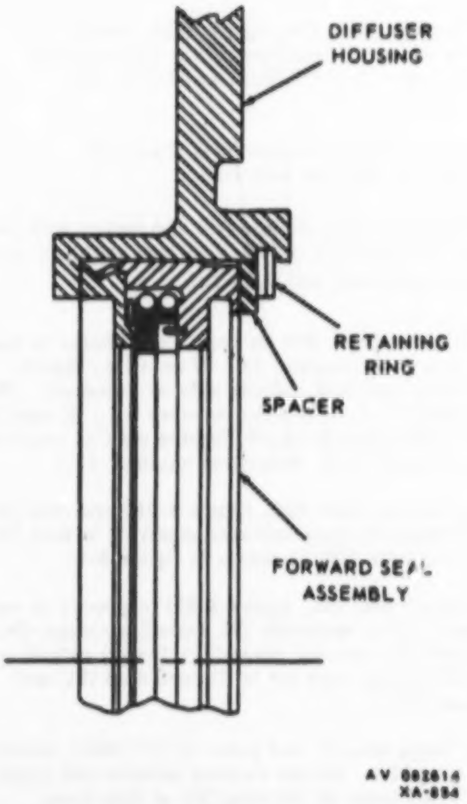


Figure 9-8. Forward Seal - Installation (T53-L-15/701)

Remove six bolts (20, figure 3-28) and washers (19) from housing.

CAUTION

Before installation, inspect as follows: Dimples on ID of combustion chamber liner must contact OD of first stage gas producer nozzle deflector. This may be accomplished by applying iron-blue pigment (item 55, table 2-2) to the liner dimples and mating the nozzle and liner to simulate hot end installation. If contact is not evident through 360 degrees, carefully bend liner tab(s) inward as required.

h. Position combustion chamber deflector (11, figure 3-28, sheet 1) and first stage gas producer nozzle assembly (12) on rear bearing housing assembly (7) and into diffuser housing assembly.

NOTE

Prior to nut and bolt installation, in following step i., apply Ease-Off Lubricant (item 32, table 2-2) or Molykote anti-seize thread compound (item 78, table 2-2) to threads.

Support plate (13, figure 3-28, sheet 1) is used only with first stage gas producer nozzles (1-110-520-14 and 1-110-520-21).

Do not install washer (14) if stud (8) and nut (16) are installed.

i. Position support plate (13) and secure with two washers (14) and nuts (15), or nuts (16), at the 12- and 6- o'clock positions, and bolts (20).

j. Tighten bolts (20) as required. (Refer to table 11-3, reference number 36.) If nuts (15, figure 3-28) were installed, tighten nuts as required. (Refer to table 11-3, reference number 51.) If nuts (16, figure 3-28) were installed, tighten nuts as required. (Refer to table 11-3, reference number 52.)

k. Lockwire bolts (20, figure 3-28) and nuts (16 and 15) together; then lockwire studs (9) to nuts (16 and 15) or bolts (20) as shown in figure 9-9.

l. Install seal (21, figure 3-28) in groove of rear bearing housing assembly (7). Install packings (34) in grooves of retaining plate (22). Install retaining plate (22) taking care not to disturb seal (21) and packings (34).

m. Using adapter and guide (LTCT3685), install aft oil ring (24). Do not remove adapter and guide (LTCT3685) from aft oil ring (24) at this time.

n. Install gasket (23) in groove of retaining plate (22).

CAUTION

Exercise care during installation to prevent damage to carbon sealing elements. Carefully guide gasket (23) over adapter and guide (LTCT3685) and onto aft oil ring (24).

NOTE

Prior to installation of bolts (31), apply molybdenum disulfide powder (item 76, table 2-2) to threads.

NOTE

To prevent axial seal movement and improper seat of retaining ring (25) ensure that retaining ring (25) is seated properly when installed in following step O. (Refer to para 7-172, figure 7-109A).

o. Position retaining ring (25), seal (26), and r
tainer (27) as a unit against retaining plate (22)
taking care not to disturb gasket (23). Secure with
three bolts (35). Tighten bolts as required. (Refe
to table 11-3, reference number 53.) Remove ada
ter and guide (LTCT3685).

p. Position sealing ring (28) on aft face of seal
(26) and retainer (27), align bolt holes and secure
with eight bolts (36). Tighten bolts as required.
(Refer to table 11-3, reference number 49.) Retig
en bolts (35, figure 3-28) (reference number 53).
After five minutes release torque on bolts (36) an
tighten (reference number 49.)

q. Using installing tool (LTCT4013), install s
(29) and forward cone (30). Ensure parts bottom
against aft oil ring (24).

r. Establish clearance between first stage ga
producer nozzle assembly (12) and first stage ga
producer turbine rotor assembly (32) as follows:

(1) Place locating bar (LTCT153) on first stage gas producer nozzle assembly (12).

(2) Using depth micrometer, measure fro
bar to inner shroud. Subtract bar thickness. R
is dimension A, figure 9-10.

(3) Using micrometer, measure thickness
rotor assembly (dimension B).

(4) Subtract dimension A from dimension
The result is the height the rotor protrudes abov
the nozzle cylinder on a line-to-line fit.

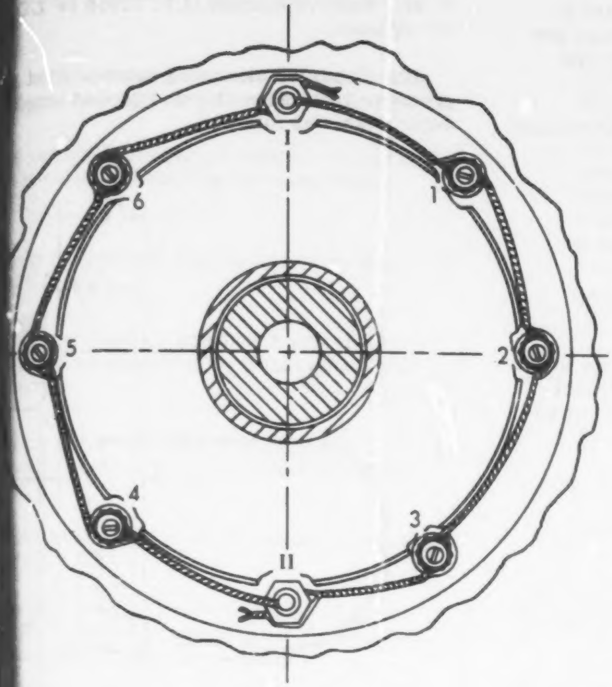
(5) Install turbine rotor assembly over po
shaft splines, and temporarily secure with nut (
figure 3-28, sheet 2), lockring (49) and rear co
(48). Hand tighten nut.

(6) Place locating bar (LTCT153) on rotor disc.

(7) Using depth vernier, measure from bar to le cylinder (dimension C).

(8) Using a depth vernier, measure from bar rbine blades (dimension D).

(9) Subtract dimension D from dimension C. lt will be dimension E.



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re 9-9. Rear Bearing Housing Studs, Nuts, and Bolts - Lockwiring Procedure (T53-L-15/701)

ubtract result of step (4) from dimension
vill be clearance F.

Clearance F must be as given in table 11-4,
umber 64. If desired clearance is not
elect spacer (29, figure 3-28, sheet 1)
thickness.

NOTE

ance of more than 0.080 to 0.090
educes the number of threads en-
by nut (50, sheet 2).

emove turbine rotor assembly and for-
install shim of size determined in pre-
(11).

bolts (31, sheet 1) through first stage
r rotor assembly from forward side.

first stage gas producer turbine rotor
ver rear compressor shaft splines.

cate threads of nut (50, sheet 2) with
disulfide powder (item 76, table 2-2).

rear cone (48), lockring (49), and nut

NOTE

owing step w., ensure that bolts
awn completely through torque
. Refer to table 3-5 for tools necessary to install the nut, lockring, and cone in following steps w. through y.

w. Install torque fixture over bolts (31, sheet 1) of first stage gas producer turbine rotor, engaging tangs of wrench socket with slots in nut (50, sheet 2) and secure fixture with nuts (44, sheet 2).

NOTE

In step x., nut (50, sheet 2) shall not extend beyond aft face of compressor rotor rear stub shaft, in excess of limits given in table 11-4, reference number 61A.

x. Using power wrench, tighten nut (50), as required. (Refer to table 11-3, reference number 48.) Remove power wrench and torque fixture.

NOTE

An alternate method to steps w. and x. is shown in following steps xA. through y.

When installing hub and adapter assembly in step xA., ensure that bolts are drawn completely through assembly. Refer to table 3-5 for tools necessary to install the nut, lockring, and cone in steps xA. through y.

xA. Install hub and adapter assembly (refer to table 3-5) over bolts (31, sheet 1) of first stage gas producer turbine rotor assembly and secure with tabwashers (43, sheet 2) and nuts (44).

xB. Position and secure holding fixture to diffuser housing.

NOTE

> In following step y., nut (50) shall not extend beyond aft face of compressor rotor rear shaft in excess of limit given in table 11-4, reference number 61A.

y. Engage tangs of wrench socket with slots in nut (50). Tighten nut. (Refer to table 11-3, reference number 48.) Remove holding fixture and hub and adapter assembly.

NOTE

> Nut shall not extend more than 0.060 inch beyond aft face of compressor rotor, rear stub, shaft.

z. Mount bracket (LTCT3955 or LTCT910) on flange of air diffuser.

NOTE

> Bracket is used as a base for dial indicator while taking runouts.

aa. Position dial indicator against point just inboard of first stage gas producer turbine blade roots. (See figure 9-10.) Rotate gas producer turbine rotor assembly and record runout. Runout shall be as given in table 11-4, reference number 65.

NOTE

> A combination of runouts determined in following step ab. and preceding step aa. shall not exceed 0.006 inch.

ab. Position dial indicator on rear flange of gas producer turbine rotor assembly. (See figure 9-10.) Rotate gas producer turbine rotor assembly and record runout. Runout shall be as given in table 11-4, reference number 67.

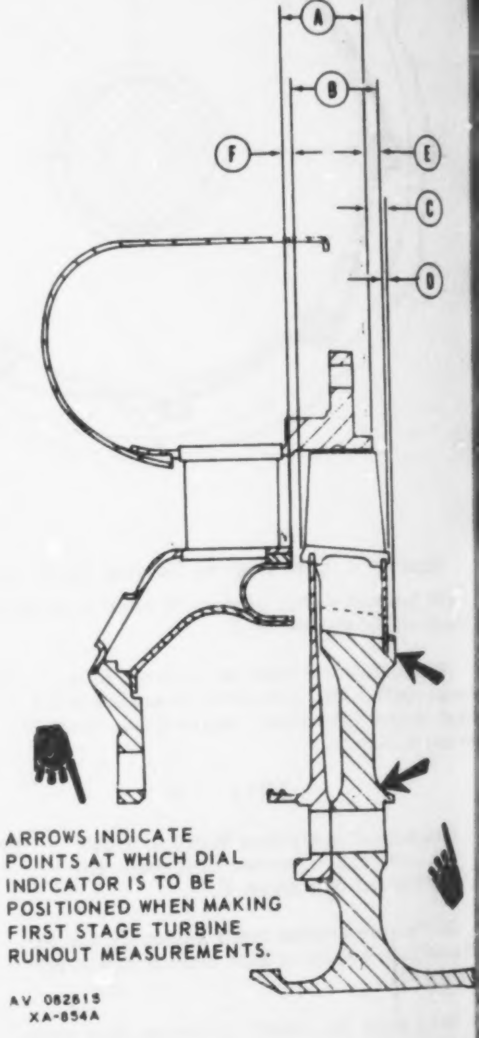
ac. If runouts are not within limits, remove first stage gas producer rotor assembly and reposition it 180 degrees from removed position. Repeat preceding step aa. If limits are still exceeded, try 90 degrees or 270 degrees from original position. If limits are still exceeded, inspect. If necessary replace forward cone (30, figure 3-28, sheet 1) and repeat step aa. Record information in engine log.

ad. Check first stage gas producer rotor for minimum tip clearance. (Refer to table 11-4, reference number 81.)

ae. Bend lockring (49) into slots of nut (50) in two places. 180 degrees apart. Do not shear lockring.

af. Remove bracket (LTCT3955 or LTCT910) fr air diffuser.

ag. Establish clearance between first stage gas producer rotor assembly and second stage gas producer nozzle as follows:



ARROWS INDICATE POINTS AT WHICH DIAL INDICATOR IS TO BE POSITIONED WHEN MAKING FIRST STAGE TURBINE RUNOUT MEASUREMENTS.

Figure 9-10. Determining Clearance Between Fi Stage Gas Producer Nozzle and Rotor Assembly (T53-L-15/701)

(1) Place locating bar (LTCT153) on gas producer rotor

(2) Using vernier depth gage, measure from locating to first stage nozzle cylinder (dimension A, figure 9-11).

(3) Using vernier depth gage, measure from locating to base shroud of first stage gas producer blades ension B).

(4) Subtract dimension B from dimension A. Result will mension C.

(5) Place second stage gas producer nozzle on a bench, ard face up. Place a locating bar across tangs on for- d face of nozzle.

(6) Using a vernier depth gage, measure from bar to lip er shroud of nozzle, and subtract thickness of bar sion D).

(7) Subtract dimension C from dimension D. Result will mension E.

(8) Clearance E must be as given in table 11-4, refer- mber 80. If desired clearance is not obtained, install r (33, figure 3-28, sheet 1) as required.

Install expansion spring (40, sheet 2) and seal ring into groove on OD of second stage gas producer nozzle.

CAUTION

In following step ai., due to the "floating" design of the second stage turbine nozzle and the scalloped outer flange of the first stage turbine nozzle, it is imperative that a minimum of one spacer (33) 1-120-029-01 or -03 be used. Additional spacers, either -01 or -02, may be used as required; however, an 1-120-029-01 or -03 spacer should always be located against the second stage gas producer nozzle flange.

ai. Install spacer (33, sheet 1), ring (37, sheet 2), and, using ring compressor (LTCT4155), install second stage gas producer nozzle assembly (38), and second stage gas producer cylinder (51). Align bolt holes and install pins (52).

CAUTION

In following step aj, use bolts, 1-110-262-01 only.

In following step ak, to prevent shearing, do not over torque bolts.

aj. Lubricate threads of bolts (45, sheet 2) with Molykote antiseize thread compound (item 78, table 2-2) or Ease-Off 990 (item 32, table 2-2).

ak. Install bolts and position three retaining plates (53) on pins. Tighten bolts as required (refer to item 36A, table 11-3) and lockwire. The shank shall be single-strand wired with one 360° strand of 0.020 inch lockwire.

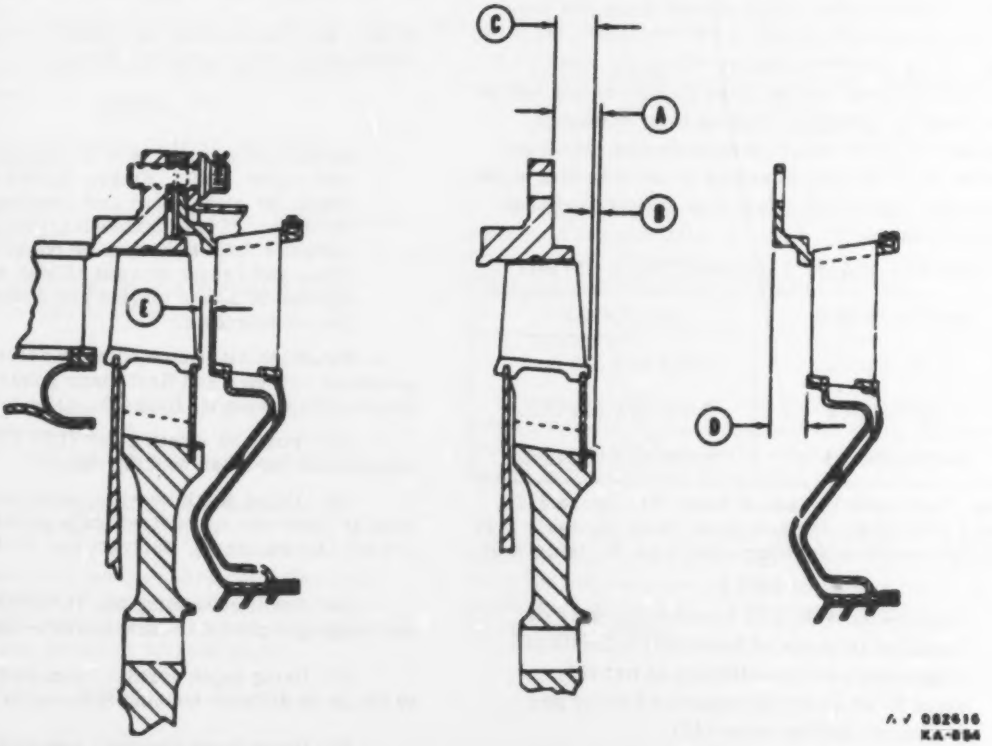


Figure 9-11. Determining Clearance Between First Stage Gas Producer Rotor and Second Stage Gas Producer Nozzle (T53-L-15/701)

NOTE

In following step al., it is necessary to install four expanders 1-300-488-01 when seal rings 1-300-351-01 are installed. When seal rings 1-300-487-01 or -02 are installed, expanders are not required

al. Install four expander springs (46) if required, and two seal rings (47) into grooves on OD of second stage gas producer cylinder.

NOTE

When performing following step am., alignment marks on spacer and first stage gas producer rotor must be aligned.

am. Position spacer (39) on first stage gas producer turbine bolts.

an. Rotate gas producer rotor assemblies and check for rubbing between second stage gas producer nozzle assembly (38) and spacer (39). If rubbing is detected, rework nozzle, using half-round file, to obtain clearance.

CAUTION

When performing following step ao., ensure that forward face of rotor is toward front of engine..

ao. Temporarily install second stage gas producer turbine rotor assembly (42) on spacer (39).

ap. Using suitable diameter wire gage, check clearance between second stage turbine nozzle and second stage gas producer turbine rotor assembly. Clearance must be as given in table 11-4, reference number 79. If desired clearance is not obtained, select spacer (33, figure 3-28, sheet 1) of correct thickness. (Refer to table 9-1.)

Table 9-1. Spacer Thickness (T53-L-15/701)

PART NUMBER	THICKNESS
1-120-029-01	0.022 to 0.028 inch
1-120-029-02	0.010 to 0.016 inch
1-120-029-03	0.078 to 0.084 inch

aq. Lubricate threads of bolts (31, figure 3-28, sheet 1) with Ease-Off Lubricant (item 32, table 2-2) or Molykote anti-seize compound (item 78, table 2-2).

NOTE

Capscrews (4-40 x 3/4-inch long) may be installed in place of bolts (31) to facilitate alignment and installation of nut (44, sheet 2) while securing second stage gas producer turbine rotor (42).

Nuts (44) have a machined washer surface. This surface must be positioned towards the rotor assembly.

In following step ar., do not bend tabwashers at this time.

ar. Secure rotor with tabwashers (43) and nuts (44). Engage tangs of wrench socket (LTCT4181) with nut (50) to prevent compressor rotor shaft fro turning. Tighten nuts (44) as required. (Refer to table 11-3, reference number 37.)

as. Position dial indicator against point just inboard of second stage gas producer turbine blades roots. (See figure 9-12.) Rotate gas producer turbine rotor assembly, and record runout. Runout sh be as given in table 11-4, reference number 76.

NOTE

A combination of runouts determined in following step at. and preceding step as. shall not exceed 0.006 inch.

at. Position dial indicator on step, inboard of bolt circle. (See figure 9-13.) Rotate gas produc turbine rotor assembly, and record runout. Runo shall be as given in table 11-4, reference number 66.

au. If runouts are not within limits, loosen and retighten nuts (44, figure 3-28.)

av. Bend tangs of tabwasher against flats of nut

9-26. INSTALLATION OF COMBUSTOR TURBINE ASSEMBLY (T53-L-15/701 Engines).

NOTE

Install power shaft bolt (5, figure 3-24) into power shaft. Finger-tighten to check for cleanliness and condition of threads. If any tightness exists or shoulder fails to bottom on power shaft, clean and repair threads. Clean mating splines of power turbine and power shaft. Do not lubricate.

a. Establish clearance between second stage ga producer cylinder and first stage power turbine nozzle (dimension B, figure 9-14) as follows:

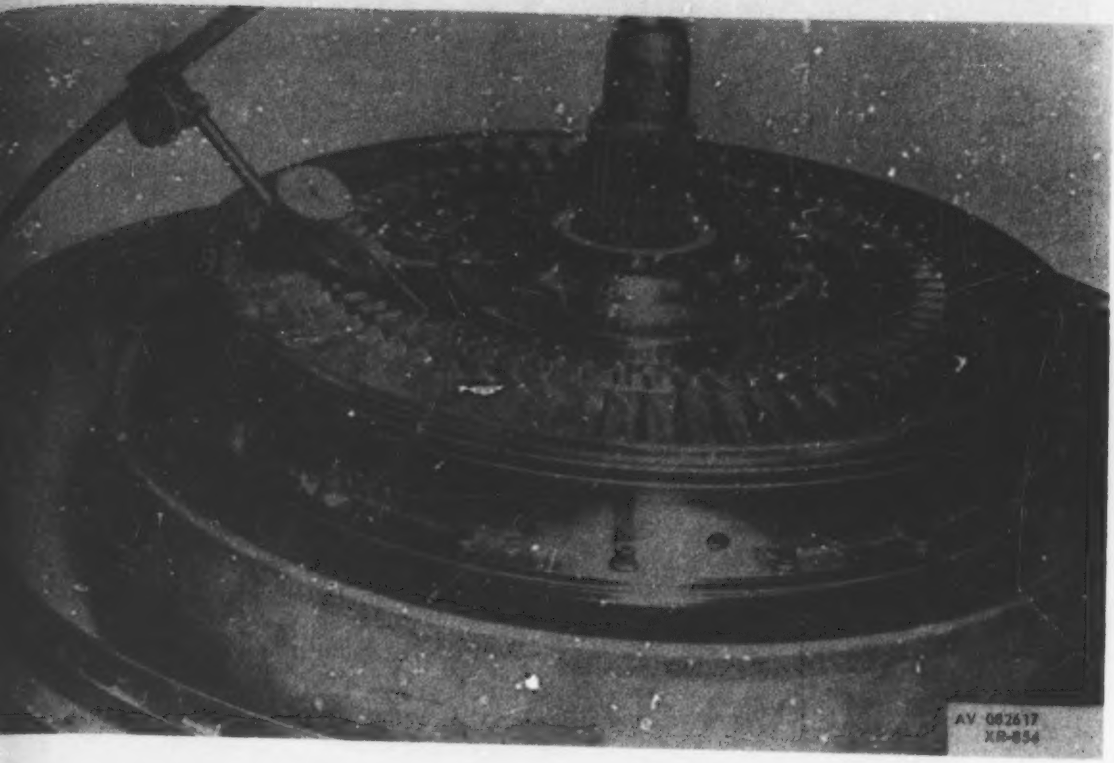
(1) Position locating bar (LTCT153) over combustion chamber housing flange.

(2) Using depth vernier, measure from bar step at outer shroud of first stage power turbine nozzle (dimension A). Subtract bar thickness.

(3) Position locating bar (LTCT153) over se ond stage gas producer turbine rotor disc.

(4) Using depth vernier, measure from bar to flange of diffuser housing (dimension E).

(5) Using depth vernier, measure from bar to second stage gas producer cylinder (dimension



ure 9-12. Checking Runout of Second Stage Gas Producer Turbine Rotor Blade Roots (T53-L-15/701)

6) Subtract dimension C from dimension E.
is dimension D.

7) Subtract dimension D from dimension A.
is dimension B.

8) Dimension B shall be as given in table 11-4,
ce number 77.

Position mating marks as recorded when
tor turbine was removed.

NOTE

a new combustor section or a new power
rbine rotor is installed, position mating
arks 180 degrees apart during installation.

mating marks not made at disassembly,
oceed with steps b. and c.

eck position of mating mark centerpunched
f male spline of power shaft. Using mark-
il (item 72, table 2-2), mark position on face
d stage gas producer turbine wheel.

NOTE

erhauled power turbine rotors may
e splines centerpunched two or more times, depending on the number of times the wheel has been rebladed. Use the mating mark with the greatest number of centerpunch marks.

c. Check position of mating mark centerpunched on face of female spline on first stage power turbine rotor. Using marking pencil (item 72, table 2-2), mark position on outside diameter of shaft.

d. (Deleted)

e. Remove N2 tachometer (if installed) from overspeed governor and tachometer drive gearbox and engage a 1/4-inch drive extension and hinge handle in tachometer drive gear.

f. Raise aft end of power shaft and push shaft forward. Rotate power shaft and ensure that N2 drive train has been engaged by checking for rotation of tachometer drive gear. A firm resistance must be felt at hinge handle.

NOTE

After performing this engagement check, do not allow power shaft to move aft.

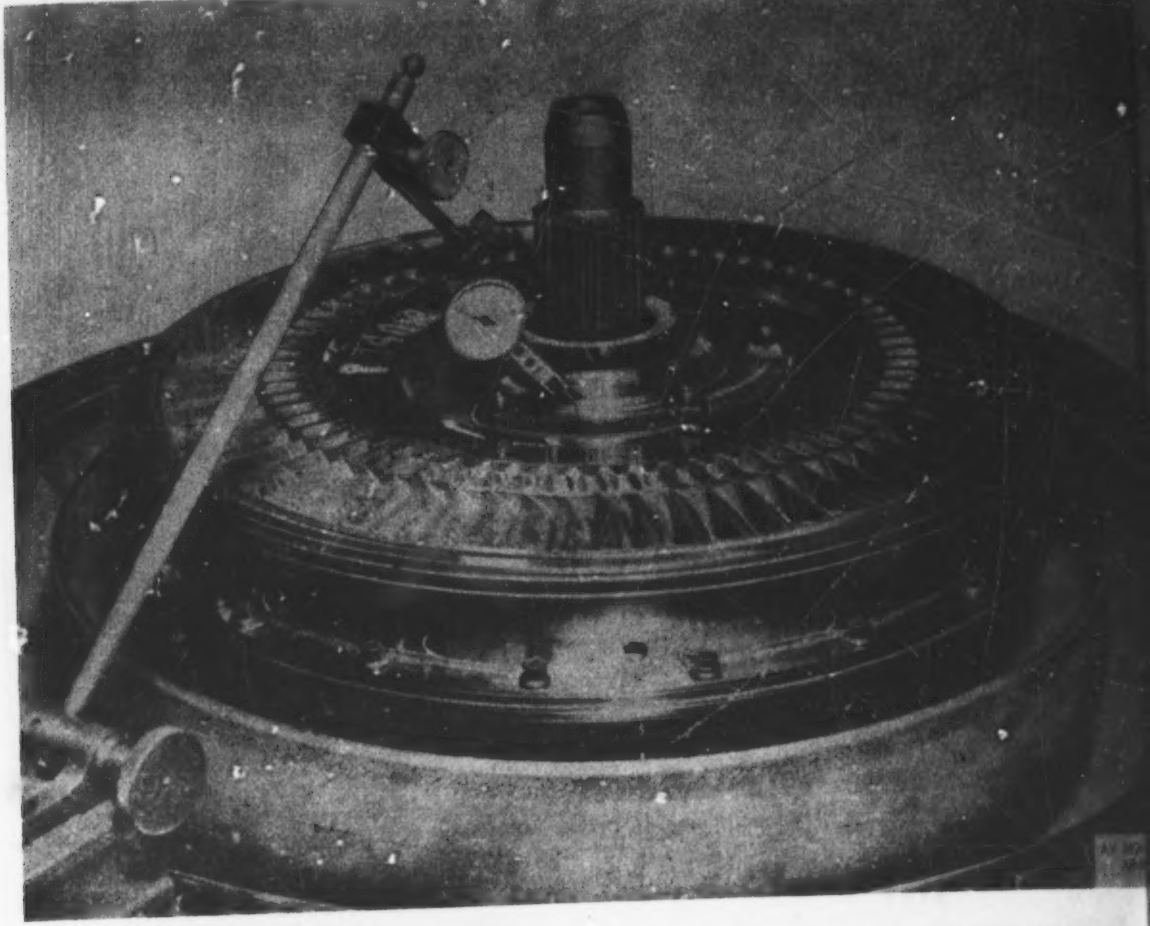


Figure 9-13. Checking Runout of Second Stage Gas Producer Turbine Rotor Disc (T53-L-15/701)

CAUTION

If the combustor turbine assembly or major subassembly has been replaced, it is necessary to establish a new power shaft bolt flange depth. Compare original and new flange depth measurements. (Refer to paragraph 3-45.) If they differ by more than 0.010 inch, add or remove shims to maintain original flange depth measurement. A maximum of three shims may be installed. If original measurements cannot be determined, refer to paragraph 9-27.

g. Position combustor lifting device (refer to table 3-3) around flange of diffuser support cone. (See figure 3-27.)

CAUTION

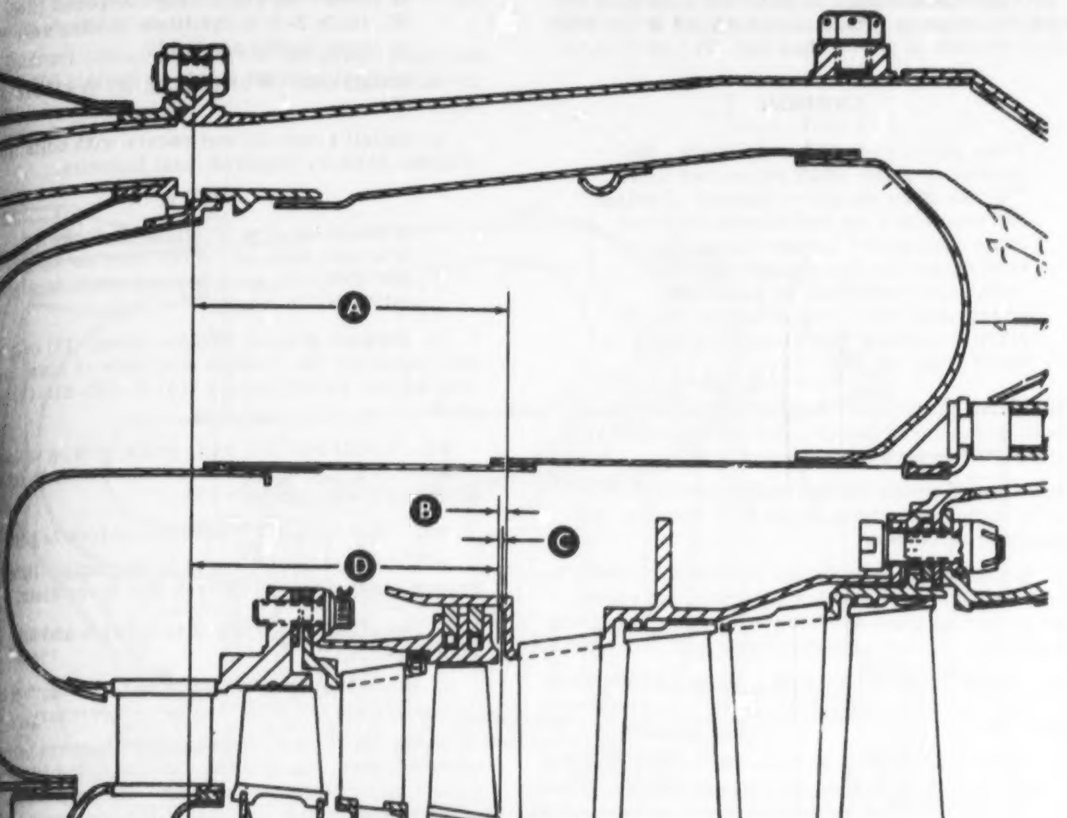
Before installation, inspect as follows. Dimples on ID of combustion chamber liner must contact OD of first stage gas producer nozzle deflector. This may be accomplished by applying iron-blue pigment (item 55, table 2-2) to the liner dimples and mating the nozzle and liner to simulate hot end installation. If contact is not evident through 360 degrees, carefully bend liner tab(s) inward as required.

h. Attach suitable hoist to lifting device and i combustor turbine assembly on diffuser housing sembly with combustion chamber drain valve loc at 6-o'clock position.

i. Using wrench (LTCT393), install bolts (2, ure 3-24) and nuts (1) that secure combustor tur assembly (3) to diffuser housing.

NOTE

Reinstall all brackets at areas where indicated during removal.


A
B
C
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E
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Figure 9-14. Determining Clearance Between First Stage Power Turbine Nozzle and Second Stage Gas Producer Cylinder (T53-L-15/701)

j. Apply light coating of Ease-Off Lubricant or Molykote antiseize thread compound (32 or 78, table 2-2) to threads of power shaft bolt (5).

CAUTION

When performing following step k., the number of shims shall not exceed three. The use of an excessive number of shims can result in a cocked through-bolt and cause high power turbine vibration. Ensure shims are flat against shoulder within rotor shaft before installing power shaft bolt. Shims may be held in place by coating with shortening compound (item 95, table 2-2).

k. Install power shaft bolt and adjust its position with shim thickness as recorded during removal or as corrected in CAUTION preceding step g.

kA. Rotate power turbine and ensure that N2 drive train is engaged by checking for free rotation of tachometer drive gear.

l. Install torque adjustment fixture (LTCT962) into rear of combustor turbine assembly and engage tangs of locking plate assembly with slots in bearing retainer nut. Secure plate assembly with three bolts.

m. Using wrench (LTCT506), tighten power shaft bolt (5) as required. (Refer to table 11-3, reference number 45.)

n. Apply light coating of Ease-Off Lubricant (item 32, table 2-2) or Molykote antiseize thread compound (item 78, table 2-2) to threads of power turbine rotor shaft and wrenching nut (6).

o. Using wrench (LTCT505), install nut (6, figure 3-24). Tighten nut as required. (Refer to table 11-3, reference number 46.)

p. Remove internal wrenching nut and retighten power shaft bolt (5, figure 3-24) as required. (Refer to table 11-3, reference number 45.) Reinstall nut and tighten as required. (Refer to table 11-3, reference number 46.)

NOTE

When wrenching nut is being reinstalled in the power shaft, deforming of the collar must be accomplished in a new area.

q. Using end of suitably rounded punch, or side of tapered drift punch, deform collar of nut to extend into three slots of power turbine rotor shaft.

r. Visually inspect nut for cracks that may have occurred as a result of deformations. If nut is cracked, it must be repaired or replaced.

s. Remove torque adjustment fixture (LTCT962).

NOTE

When performing following step t., ensure groove in cover (9, figure 3-24) is clean. If seal (7) is to be installed, coat groove of cover with shortening compound (item 95, table 2-2) to facilitate holding seal in cover during assembly.

t. Install seal (7) or packing (8) in groove of cover (9).

u. Install cover (9) and secure with bolts (10). Tighten bolts as required, and lockwire.

NOTE

In following step v., tab with lockwire hole with face out. If tab does not fit into slot, file rear bearing cover locally until tab fits snugly.

v. Position exhaust diffuser cover (11) over rea bearing cover (9). Ensure that slots of cover are aligned and install tablock (12) (1-160-635-01) into slots.

vA. Install bolt (13) and, while holding tablock i position, tighten bolt as required. (Refer to table 11-4, reference number 45A.)

vB. After torquing, lockwire tablock to bolt.

vC. Reinspect with aid of an inspection light for proper engagement of tablock and cover slots.

w. Install four starting fuel nozzles and four igniter plugs.

x. Reconnect ignition leads and starting fuel hos assembly. Secure with clamps as necessary.

y. Install exhaust thermocouple harness on exhaust diffuser. Apply Ease-Off Lubricant (item 32, table 2-2) or Molykote antiseize thread compound (item 78, table 2-2) to exhaust thermocouple harne studs and tighten nuts.

9-27. POWER SHAFT BOLT FLANGE DEPTH MEASUREMENT (T53-L-15/701 Engines). If origi flange depth measurements have been lost, determi flange depth measurement as follows:

a. If installed, remove power shaft bolt (5, figu 3-24) and locating shim (4).

CAUTION

If power shaft is not in extreme forward position in following step b., engine failure can result.

b. Using a clean rod (wood or phenolic dowel), gently but firmly push power shaft to extreme forward position.

c. Place locating button bar (LTCT153) across back of exhaust diffuser and note dimension from b to aft end of power shaft. This is dimension A. (Se figure 9-14A.)

d. With bar in the same position, note dimensio from bar to power shaft bolt seating shoulder in power turbine wheel. This is dimension B.

e. Subtract dimension B from dimension A to obtain dimension C.

f. Subtract 0.230 inch from dimension C to obtain sion D.

f. Subtract dimension D from the power shaft bolt gth (5.400 inches) to obtain the required thickness shim.

9-28. INSTALLATION OF ACCESSORY DRIVE GEARBOX ASSEMBLY. Install as follows. (See figure 3-14.)

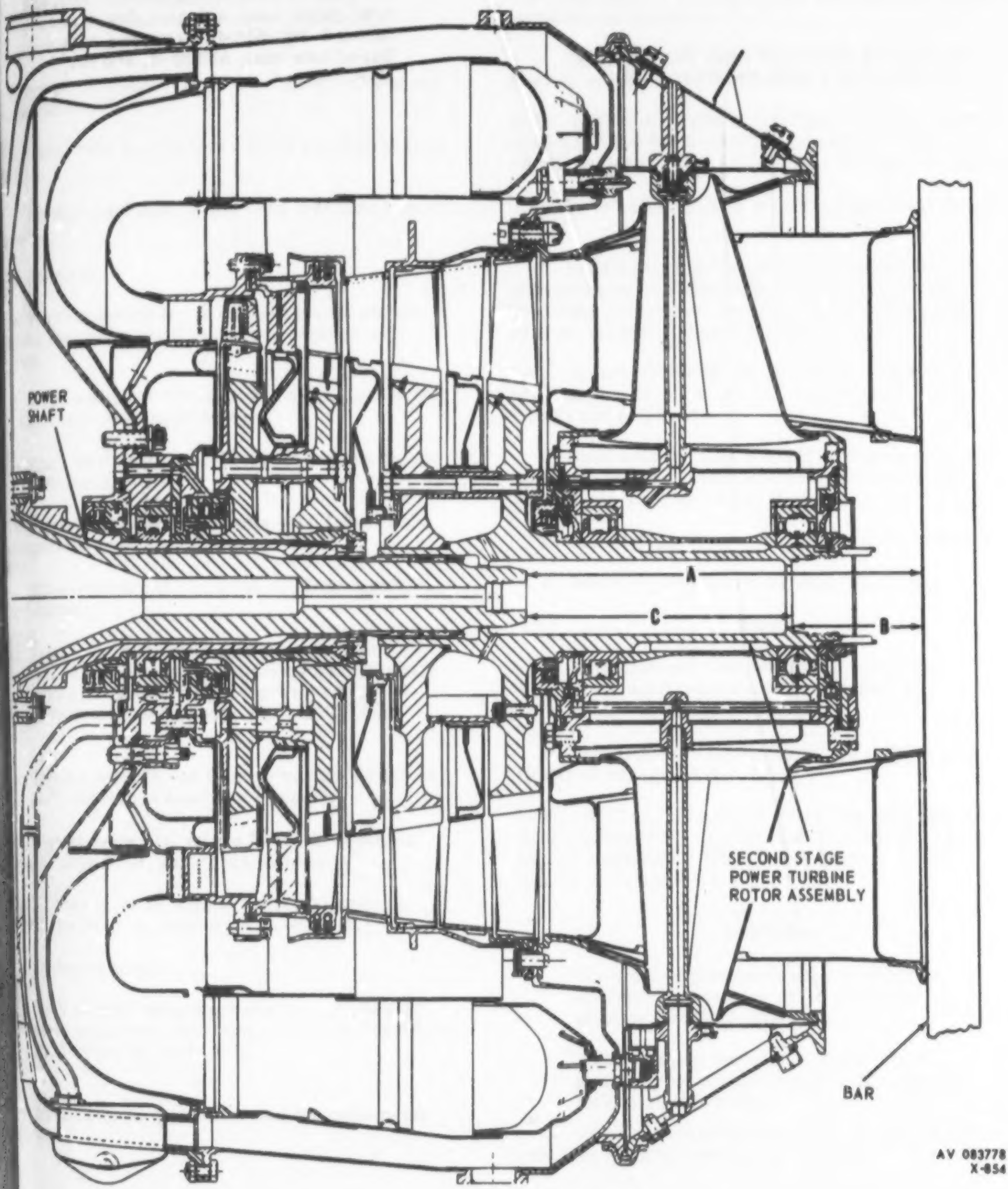

POWER SHAFT
A
C
B
SECOND STAGE POWER TURBINE ROTOR ASSEMBLY
BAR
AV 083778
X-854

Figure 9-14A. Measuring Power Shaft Bolt Flange Depth (T53-L-15/701)

NOTE

On T53-L-7/7A engines when accessory drive gearbox 1-080-250-13 is installed, a fuel control, P/N 81500B4, P/N 81500B5, or P/N 81500B6, with a long driven splined shaft and special seal 1-300-368-01 must be installed.

In order to install forward, left mounting bolt (not illustrated), the rotary (oil) pump (if installed) must be removed before accessory drive gearbox is installed.

On T53-L-7/7A engines, gearbox 1-080-250-16 can be used provided No. 2 bearing scavenge line fitting, AN815-6D, is replaced with fitting, AN919-12D, and inlet guide vane actuator drain line fitting 1-160-616-01 is capped with flared tube seal, AN929-4, and nut, AN818-4.

CAUTION

Under no circumstances will a fuel control with a short-splined shaft replace a fuel control with a long-splined shaft on accessory drive gearbox 1-080-250-13 or 1-080-250-16. Accessory drive gearbox 1-080-250-13 or 1-080-250-16 may be readily identified by the additional dowel pin on the fuel control mount pad. This pin must not be removed.

a. Install packings (13 and 15, figure 3-14) on oil rainer assembly (14).

b. Install tube in accessory drive gearbox assemy (6).

c. Position packings (2 and 3) on mounting face of arbox.

d. (Deleted)

e. Position accessory drive gearbox on engine suring that drive shaft drops and meshes with arbox.

f. Place washer 1-080-051-01 on shouldered bolt). Insert bolt and finger-tighten.

g. Place washer 1-080-051-01 on bolt (9). Insert lt and finger-tighten.

h. Place washers (12) on bolts (11). Insert bolts d finger-tighten.

i. Place washers (4) on bolts (5). Insert bolts and ger-tighten.

j. Using 1/4-inch drive extension and ratchet, n gearbox tachometer drive gear. Check through let housing to ensure that compressor rotor is ning. This indicates proper meshing of drive aft.

k. Tighten bolts (8 and 9) as required. (Refer to ble 11-3, reference number 11 and 10.)

l. Tighten bolts (11, figure 3-14) as required. fer to table 11-3, reference number 9.)

m. Tighten bolts (5, figure 3-14) as required. fer to table 11-3, reference number 12.)

n. Lockwire bolts.

o. Pack mating female splines for tachometer d starter generator two-thirds full with Plastilube bly No. 3 (item 88, table 2-2).

p. Install starter generator and N1 tachometer nerator.

q. Install fuel control.

r. Install power driven rotary (oil) pump. (Refer to paragraph 5-105).

s. Reconnect electrical wiring at chip detector

t. Connect inlet guide vane actuator seal drain hose assembly to adapter fitting on gearbox. Tighten connector as required.

u. Reconnect lubrication scavenge hose assemblies to accessory drive gearbox assembly.

9-29. INSTALLATION OF OVERSPEED GOVERNOR AND TACHOMETER DRIVE ASSEMBLY (T53-L-7/7A/15 Engines). (See figure 3-11.) Proceed as follows:

a. Insert shaft (8) into inlet housing mounting pad hole.

b. Install packings (9 and 10) and overspeed governor and tachometer drive assembly (3) on mounting pad of inlet housing. Ensure that splines of shaft (8) are properly engaged.

c. Secure with bolts (2, 4, and 6), bracket (11), and washers (5 and 7 and 1). Tighten bolts as required and lockwire.

d. Slide tube (5, figure 5-23) forward into overspeed governor and tachometer drive assembly. Expand and slide retaining ring (4) into place.

e. Install splined nuts (1) in overspeed governor.

f. Insert topping governor drive shaft (2).

NOTE

Establish end float of topping governor drive shaft before performing step g. (Refer to paragraph 5-78.)

g. Install power-driven rotary (booster) pump. (Refer to paragraph 5-113.)

9-30. INSTALLATION OF TOPPING GOVERNOR AND OVERSPEED GOVERNOR TACHOMETER DRIVE ASSEMBLY (T53-L-701 Engine). (See figures 3-12 and 3-13.)

CAUTION

The topping governor and overspeed governor tachometer drive assembly must be installed as a unit.

When rotating the splined shaft of the fuel control, always rotate it in a counterclockwise direction.

a. Reindex condition lever arm on topping governor by turning condition lever counterclockwise.

until condition lever arm is 1/8 inch from shutoff mechanical stop. Manually rotate splined shaft on the regulator in a counterclockwise direction until resistance is felt.

b. Install packing. MS29513-10. (4. figure 3-12) on governor standpipe and rectangular rubber seal, P/N 41145. (5) in annular cavity in governor.

c. Install packings (8 and 10, figure 3-13) on overspeed governor and tachometer drive assembly.

d. Insert shaft (9) into inlet housing mounting pad hole.

e. Before installation of topping governor and overspeed governor and tachometer drive assembly, establish end float of topping governor drive shaft (2. figure 5-29) as follows:

(1) Install topping governor drive shaft into topping governor and into overspeed governor and tachometer drive assembly. Do not install tube (5) at this time.

(2) Temporarily install topping governor and overspeed governor and tachometer drive assembly as a unit by positioning unit over splined shaft in fuel control and mounting holes in inlet housing.

(3) Secure topping governor and overspeed governor and tachometer drive assembly with screws and washers (9 and 10) and with bolts (2, 4, and 6, figure 3-13) and washers (5 and 7).

(4) Push topping governor drive shaft aft as far into governor housing as possible.

(5) Attach C-clamp to shaft and zero dial indicator against C-clamp.

(6) Slide shaft forward into overspeed governor and tachometer drive assembly as far as possible.

(7) Take reading on dial indicator.

(8) If end float is less than 0.090 inch, no splined nuts (1, figure 5-29) are required on drive shaft.

CAUTION

Minimum end float tolerance is not established; however, it is important that some end float exist to preclude jamming of the governor drive shaft.

(9) If end float is between 0.090 and 0.280 inch, one nut is required at fuel control (aft) end of topping governor drive shaft.

NOTE

Splined nut (1, figure 5-29) used during installation is 1-160-589-02. The number of nuts required is either none, one, or four.

(10) If end float is more than 0.280 inch, nuts are required at each end of topping governo drive shaft.

(11) Remove dial indicator and C-clamp.

(12) Remove bolts (2, 4, and 6, figure 3- and washers (5 and 7) that secure overspeed gov nor and tachometer drive assembly and screws washers (9 and 10, figure 5-29) that secure topp governor.

(13) Carefully lift topping governor and ov speed governor and tachometer drive assembly gether, free of engine. Remove topping governo drive shaft.

f. Install required number of splined nuts (1, figure 5-29) on drive shaft as determined in pre ing steps (8) through (10).

g. Install new packings (3) on tube (5).

h. Insert either end of topping governor driv shaft (2) and tube (5) into topping governor and insert the opposite end of shaft and tube into ove speed governor and tachometer drive assembly. Ensure that splines are properly meshed.

i. Lubricate condition lever shaft splines wi Plastilube Moly No. 3 (item 88, table 2-2) or Multi-Fax EP2 (item 79, table 2-2).

j. Position topping governor and tachometer drive assembly as a unit, over splined shaft in control and mounting holes in inlet housing.

k. Secure topping governor and overspeed go nor and tachometer drive assembly to fuel regu and inlet housing as follows:

(1) Place temperature sensing element li clamp under screw (9, figure 5-29).

(2) Install three remaining screws and wa (9 and 10). Lockwire screws.

(3) Secure overspeed governor and tacho drive assembly on mounting pad of inlet housing bolts (2, 4, and 6, figure 3-13), bracket (1) and washers (5 and 7). Tighten bolts as required a lockwire.

(4) Set condition lever arm at 0° STOP p tion. Release condition lever arm and note spr back of arm for external stop.

(5) If spring-back is less than 0.020 inch proceed as follows:

(a) Remove lockwire.

(b) Loosen jam nut and back out stop nominal 0.040 inch spring-back is obtained, th tighten jam nut.

(6) If spring-back is between 0.060 and 0.080 inch, proceed as follows:

(a) Remove lockwire.

(b) Loosen jam nut and screw in fuel OFF stop until a nominal 0.040 inch spring-back is obtained, then tighten jam nut.

(7) If spring-back is 0.080 inch or more, proceed as follows:

(a) Separate topping governor from fuel regulator and re-index male splined shaft one spline counterclockwise.

CAUTION

Always rotate the regulator splined shaft in a counterclockwise direction.

(b) Back off fuel OFF stop screw until a nominal 0.040 inch spring-back is obtained, then tighten jam nut.

(8) Whenever the fuel OFF stop screw has been adjusted, it is mandatory to relocate the position of the topping governor index plate and re-adjust the MAXIMUM RPM (FULL OPEN) external stop screw in the following order.

(a) Loosen index plate hold down screws.

(b) Hold condition lever arm firmly against external fuel OFF stop and reposition index plate so that OFF scribe line on plate aligns with scribe line on condition lever arm.

(c) Tighten index plate hold down screws.

(d) Rotate condition lever arm against MAXIMUM RPM (FULL OPEN) external stop screw and re-adjust MAXIMUM RPM (FULL OPEN) screw to align scribe line on index plate with scribe line on condition lever arm.

(e) Lockwire screws.

(9) Since the connecting rod was removed from the main fuel control power lever, proceed as follows:

(a) Engage connecting rod with topping governor upper lever (19, figure 5-29), using bolt. Engage other end of connecting rod with power lever, using bolt.

(b) Pin topping governor upper lever to "A" hole in block on inside of topping governor. (See figure 5-25.)

(c) Align "A" scribe on power lever with "A" hole on main fuel control index plate. Adjust rod length by rotating end bearings of rod (19, figure 5-29).

NOTE

When power lever "A" scribe has been aligned with "A" hole in index plate, insert pin through slot in power lever and into hole in index plate. Adjust rod length as necessary. Tighten connecting rod nut.

WARNING

When final rod adjustment has been made, observe inspection holes in rod ends for complete thread coverage. "Daylight" shall not be visible through inspection holes. If re-adjustment is necessary, repeat preceding step (9) (c).

(d) Engage the clevis bolts into the castle nuts. Finger-tighten nuts, then back off to nearest alignment slot and install cotter pins.

NOTE

This resultant assembly should be a loose fit. No torquing of the bolts and/or castle nuts is allowed.

(10) Secure connecting rod (19, figure 5-29) and lockwire rod.

(11) Connect vapor return vent hose (7) to governor.

l. Install electric torquemeter junction box assembly. (Refer to paragraph 5-128.)

m. Perform static check of torquemeter system. (Refer to paragraph 5-128A.)

9-31. INSTALLATION OF ENGINE ACCESSORIES.

9-32. Instructions for installation of accessories are provided in Chapter 5 of this manual. Observe precautions given in paragraph 3-31.

CHAPTER 10

FINAL ENGINE TEST

NERAL.

is chapter contains instructions for normal
sting of an engine installed in the aircraft
round testing of an engine installed in a mo-
ler assembly (LTC T744 or TE12062).

ROUND TESTING OF ENGINE IN AIRCRAFT.

NERAL. Paragraphs 10-5 through 10-20
nstructions for normal ground operation of
stalled in aircraft to determine flight readi-
so included are specific operational and
mponent checks that must be performed in
o normal ground operation. Performance
prop engine is affected by barometric pres-
ambient air temperature. Since it is not
to provide identical values determined by
prevailing atmospheric conditions, engine
te operating limits under all ambient con-
e provided in tables 10-1, 10-2 and 10-3.

ETEST INSPECTION AND CHECKS. Pro-
llows.

NOTE

form necessary abnormal weather
tenance.

ove inlet and exhaust protective covers
e.

ect engine inlet for rags, tools, or other
jects.

WARNING

onged contact with lubricating oil
63 or 64, table 2-2) may cause
rash. Those areas of skin and
ing that come in contact with lubri-
g oil should be thoroughly washed
ediately. Saturated clothing should
moved immediately. Areas in
lubricating oil is used should be
ately ventilated to keep mist and
s to a minimum.

CAUTION

icating oil (item 63 or 64, table 2-2)
soften paint upon contact. If lubri-
g oil is spilled on painted surfaces,
surfaces should be thoroughly
ed.

that aircraft oil tank is filled to proper
lubricating oil (item 63 or 64, table 2-2).

d. Visually inspect engine for leaks.

NOTE

In following step e., there should be no continuity through chip detector. If continuity is found, remove and inspect chip detector. Determine source of contamination.

e. Check chip detector for presence of foreign material, using ohmmeter (WV77E, FSCM49671).

NOTE

Power lever and condition lever should move freely between stops on control and through the full arc in following step f.

f. Check cockpit engine controls for freedom of movement.

g. On T53-L-7/7A engines, ensure that starting line is connected to proper port. (See figure 10-1.)

WARNING

Cap unused port, and lockwire cap before starting engine.

CAUTION

Under most ambient conditions, port (A) is used for operation with all fuels. If engine fails to start at low ambient temperatures with JP-5 fuel, the starting fuel line must be connected to port (B). The starting procedure is the same for this configuration as for port (A).

h. Be sure that all personnel are well clear of engine air inlet and exhaust sections.

10-6. ENGINE MOTORING. Motor the engine during fuel control priming or if other maintenance operations require it.

CAUTION

To prevent damage to starter, do not exceed starter limitations.

a. Disconnect 28-vdc power supply from ignition unit.

b. Connect external power supply to starter.

c. Check that power lever is in OFF position.

Table 10-1. Engine Steady State Operating Limits Under All Ambient Conditions (T53-L-7/7A)

COMPRESSOR ROTOR POWER RATING	MAXIMUM COMPRESSOR ROTOR (N1) SPEED (PERCENT)	MAXIMUM PROPELLER SHAFT SPEED (RPM) (Note 2)	MAXIMUM EXHAUST GAS TEMP	MAXIMUM TORQUE INDICATED (PSIG)	MAXIMUM INLET OIL TEMP	OIL PRESSUR LIMITS (PSIG)
Takeoff (5 Min)	101.5 (Note 1)	1720	640°C(1185°F)	102	99°C (210°F)	60 to 80
Military (30 Min)		1720	640°C(1185°F)	102	93°C (200°F)	60 to 80
Normal (Continuous)		1720	620°C(1150°F)	89	93°C (200°F)	60 to 80

Notes:

1. This red line limit shall not be exceeded as a steady state N1 speed.
2. If shaft speed is exceeded, refer to paragraph 12-15.

Table 10-2. Engine Steady State Operating Limits Under All Ambient Conditions (T53-L-15)

COMPRESSOR ROTOR POWER RATING	MAXIMUM COMPRESSOR ROTOR (N1) SPEED (PERCENT)	MAXIMUM SHAFT SPEED (RPM) (Note 2)	MAXIMUM EXHAUST GAS TEMP	MAXIMUM TORQUE INDICATED (PSIG)	MAXIMUM INLET OIL TEMP	OIL PRESSU LIMITS (PSIG)
Military (30 Minutes)	101.5 (Note 1)	1720	625°C(1160°F)	102	93.0°C (200°F)	80 to 10
Normal (Continuous)		1720	610°C(1130°F)	89	93.0°C (200°F)	80 to 10

Notes:

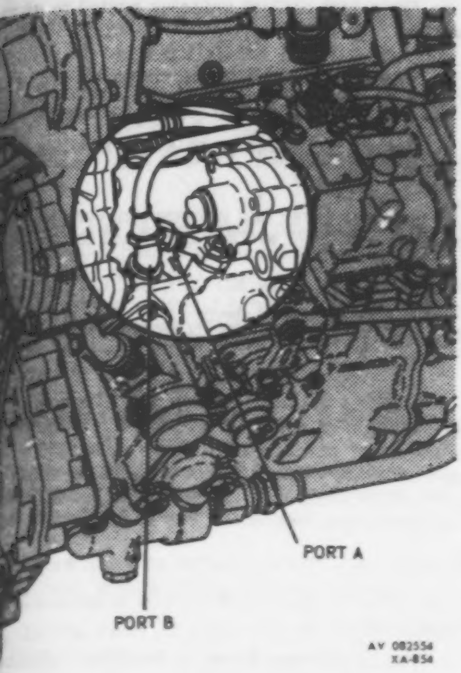
1. This limit shall not be exceeded as a steady state speed.
2. If shaft speed is exceeded, refer to paragraph 12-15.

Table 10-3. Engine Steady State Operating Limits Under All Ambient Conditions (T53-L-701)

COMPRESSOR ROTOR POWER RATING	MAXIMUM COMPRESSOR ROTOR (N1) SPEED (PERCENT)	MAXIMUM SHAFT SPEED (RPM) (Note 2)	MAXIMUM EXHAUST GAS TEMP	MAXIMUM TORQUE INDICATED (PSIG)	MAXIMUM INLET OIL TEMP	OIL PRESSU LIMI (PSIG
Military (30 Minutes)	101.5 (Note 1)	1720	630°C(1165°F)	130	93.0°C (200°F)	80 to 1
Normal (Continuous)		1720	613°C(1135°F)	122	93.0°C (200°F)	80 to 1

Notes:

1. This limit shall not be exceeded as a steady state speed.
2. If shaft speed is exceeded, refer to paragraph 12-15.



re 10-1. Piping Arrangement for Starting Fuel (T53-L-7/7A)

Motor engine with starter.

FUEL CONTROL PRIMING. This check is to erformed only if fuel control has been drained of r is removed or replaced.

Ensure proper fuel control linkage rigging.

Disconnect 28-vdc lead to ignition unit.

Disconnect starting fuel line downstream from id valve. Connect drain line to starting fuel nd provide container to catch flow.

Disconnect main fuel hose downstream from ntrol. Add drain line and place end in con- r.

Open fuel shutoff valve.

Open oil shutoff valve.

Set fuel control switch on AUTOMATIC for L-7/7A engines or to ON for T53-L-15/701 en-

Place boost pump ON.

Position power lever in GROUND IDLE or

Place condition lever forward to maximum

k. Energize starter and starting fuel solenoid valve for approximately 30 seconds.

l. Repeat preceding step k. until pure fuel flows from drain lines. Allow 3 minutes between each motoring.

m. Allow engine to coast down.

n. Set fuel control in MANUAL. Repeat preceding steps k. and m

o. Check the following during engine motoring.

(1) Indication of oil pressure on oil pressure gage.

(2) Listen for compressor rubbing during coastdown.

p. Move power lever and condition lever to OFF.

q. Disconnect drain lines and connect main and starting fuel hoses to their proper connections.

r. Visually check engine for leaks at next start.

10-8. ENGINE GROUND OPERATION CHECKS. Engine ground operation checks consist of the initial check run (new or repaired engines), the normal check run, and the acceleration check run.

10-9. INITIAL CHECK RUN. Following is the procedure for preparing an engine for check runs.

a. Remove the lube oil filter cover assembly. Clean the cover assembly in drycleaning solvent (item 28, table 2-2), and reinstall.

b. Fill the aircraft oil tank with oil (item 63 or 64, table 2-2).

NOTE

Motor engine to prime fuel control, if necessary as outlined in paragraphs 10-6 and 10-7.

c. Start engine as outlined in applicable airframe manual.

d. Operate engine for several minutes at ground idle; then shut down.

e. Inspect engine for leaks and security of mounting of hoses and accessories.

f. Start engine and run at ground idle for 3 minutes; accelerate gradually to 75 percent N1 normal rated power.

g. Decelerate engine to flight idle and run to allow EGT to stabilize for 2 minutes; shut down engine. Inspect engine as outlined in paragraph 10-10.

10-10. INSPECTION AFTER INITIAL CHECK RUN. Inspect engine for the following:

a. Leaks and security of mounting provisions, hoses, and accessories.

b. Accumulation of metal chips, lint, or other foreign material in chip detector and lube oil filter.

c. If there is no accumulation of metal chips, lint, or other foreign material, continue with engine ground operation checks.

d. If there is slight accumulation of metal chips, lint, or other foreign material, clean and reinstall chip detector and lube oil filter. Inspect No. 2 and No. 3 and 4 bearing oil strainers. Restart engine and perform a second run for several minutes. If further accumulation is found, proceed to following step e.

e. If there is an excessive accumulation of metal chips, lint, or other foreign material, the source of the foreign material must be determined. (Refer to paragraph 12-25.)

f. Remove, inspect, clean, and reinstall fuel control filters.

10-11. NORMAL CHECK RUN. The engine shall be started and operated at ground idle, flight idle, and at military or takeoff power until all instruments have been checked to ensure that engine operation is normal. Refer to applicable airframe manual. If operation is normal proceed to acceleration check.

NOTE

Inspect engine as outlined in paragraph 10-10.

10-12. ACCELERATION CHECK RUN. For acceleration check run, refer to paragraph 5-85 or 5-86.

10-13. OPERATIONAL CHECK OF EMERGENCY (MANUAL) FUEL SYSTEM (T53-L-7/7A Engines). Perform the following check after installing an engine or a fuel control, during the airframe intermediate inspection, or when a special verification of the proper operation of the fuel control emergency (manual) system is required.

CAUTION

These instructions apply only to this operational check of the fuel control.

a. Start engine. (Refer to applicable airframe manual.)

b. With fuel control selector switch in AUTO position, stabilize engine at 70 to 72 percent N1 speed.

CAUTION

If the power lever must be moved with fuel selector switch in EMER position, accomplish change slowly. During acceleration, monitor exhaust gas temperature constantly to prevent over-temperature operation.

c. Move fuel control selector switch to EMER position.

d. Note indicated N1 speed; it should drop 2 to 5 percent.

e. Return fuel selector to AUTO position within 5 seconds.

f. If power lever has not been moved, N1 speed should return to 70 to 72 percent and then stabilize.

10-14. ENGINE GROUND OPERATION CHECKS AFTER INITIAL INSTALLATION, REPAIR, OR REPLACEMENT OF MAJOR COMPONENT. Proceed a follows:

a. Perform engine vibration test after installation re-installation of engine in aircraft, if removal and re-i stallation of combustor turbine assembly has tak place (hot-end inspection), or if excessive engine vibr tion is suspected. This requirement applies to all typ of engines, new, overhaul, same or different.

aA. Start engine as described in applicable airframe manual.

b. Position power lever in TAKEOFF (T53-L-7/ or MILITARY (T53-L-15/701) position; retard to FLIGHT IDLE position. Allow engine to stabilize a flight idle rpm for 3 minutes; then accelerate engin by moving power lever to TAKEOFF or MILITARY position in one second or less. Check the following

(1) Roughness caused by unbalanced rotating parts and/or uneven combustion.

(2) (Deleted)

(3) If engine operates satisfactorily, stabiliz military or takeoff for 2 minutes and observe all in strument readings. Operate engine only within perm sible limits of speed, temperature, and oil pressure.

c. Repeat preceding step b. for GROUND IDLE position.

d. Perform acceleration check. (Refer to paragraphs 5-85 or 5-86.)

NOTE

On T53-L-15/701 engines, if surge is encountered, check operation of variable inlet guide vane. Refer to paragraph 10-35 step g.: check operation of bleed band. Refer to paragraph 10-35, steps h. through n. If operations are not within limits, adjust bleed band air trigger line. Refer to paragraph 10-38, step l. If unable to correct surge and maintain correct bleed band operation, replace fuel control.

On T53-L-15/701 engines if fuel control has been replaced to correct surge, operation of bleed band and inlet guide vanes must be rechecked prior to acceleration check. Trim fuel control as required and recheck acceleration.

CAUTION

Do not exceed engine torque limits.

On T53-L-7/7A engines, perform waveoff check follows:

(1) With engine operating, place power lever TAKEOFF position. Retard quickly (snap back) FLIGHT IDLE position.

(2) When (N1) rpm drops to 85 percent, jam er lever forward to TAKEOFF position. When off speed is reached, retard to FLIGHT IDLE ition again. Repeat power lever cycle for 75 cent and flight idle speeds.

(3) Repeat cycle if surge is encountered. If is encountered a second time, shut down en- . Replace the fuel control.

If engine operates satisfactorily, shut down en- as outlined in applicable airframe manual.

INSPECTION AFTER CHECK RUNS. In- t engine as outlined in paragraph 10-10,

ENGINE VIBRATION TEST. An engine tion test using vibration check tool kit (LTCT or vibration test set (LTCT20596), measures vibration at specified N1 and N2 operating speeds. Vibration pickups, attached to adapters mounted on the engine, transmit electrical impulses through cables to a vibration meter. The vibration meter indicates the total amount of engine movement (peak-to-peak displacement) in mils. (See figures 10-1A and 10-1B.) Meter indications are recorded on an Engine Vibration Test Data Sheet. The recorded figures are compared with the figures given on the data sheet for maximum permissible engine vibration. If these maximum figures are exceeded, the cause of the excessive vibration must be found and corrected before the engine can be accepted for unrestricted flight.

NOTE

Reference can be made to TM 55-4920-243-15, which contains the tool kit part number and Federal Stock Number and to the manual included in vibration test set (LTCT20596).

10-17. Vibration Test Preparations. Each of the following procedural steps, including checks and adjustments of the vibration equipment, must be repeated each time the equipment is assembled for an engine vibration test. All equipment required, with the exception of adapter (LTCT 6756) is included in vibration check tool kit (LTCT484) or vibration test set (LTCT20596). Each of these sets contains a vibration indicator: vibration meter (LTCT22031-01), included in test set (LTCT20596), or spectrum analyzer (LTCT 9281) included in tool kit (LTCT484). Proceed with following vibration test, using applicable procedures in accordance with the specific vibration indicator being used. Operational requirements for vibration check tool kit (LTCT484) or vibration test set (LTCT20596) are as follows:

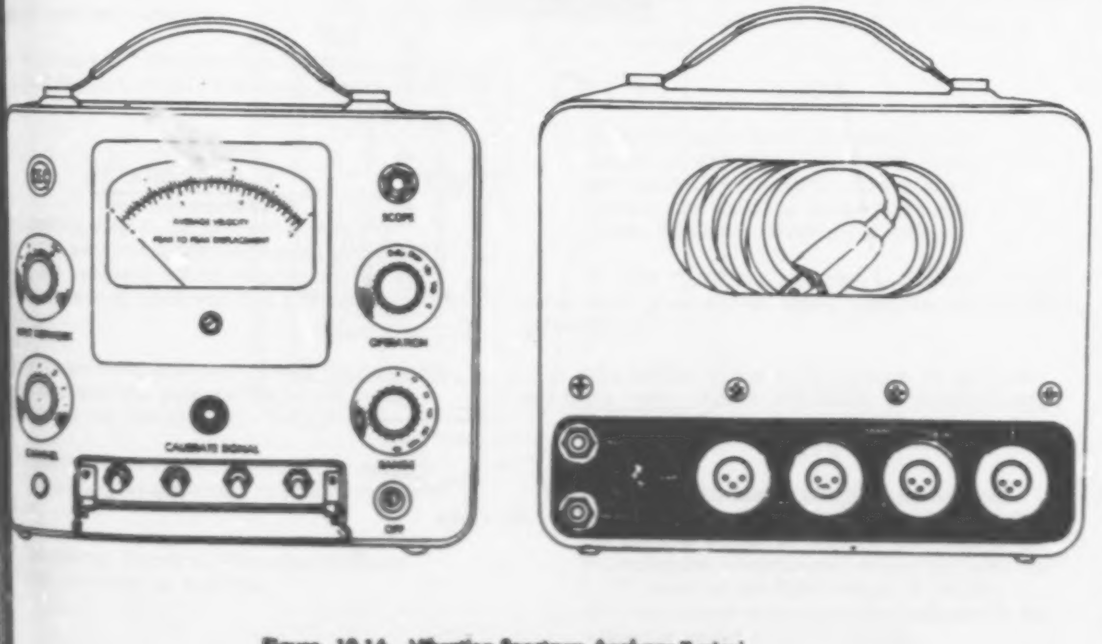
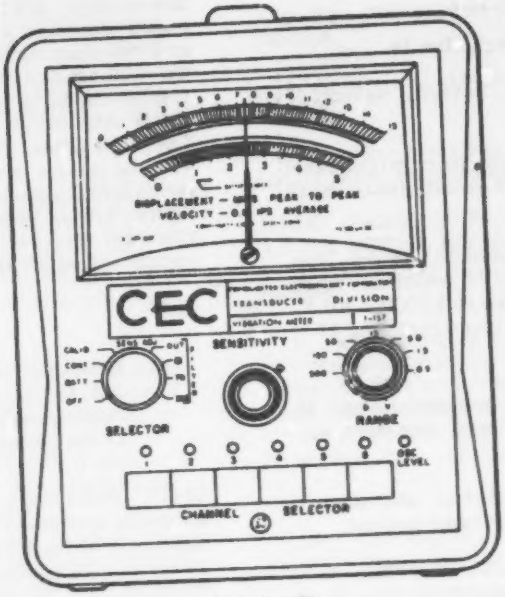
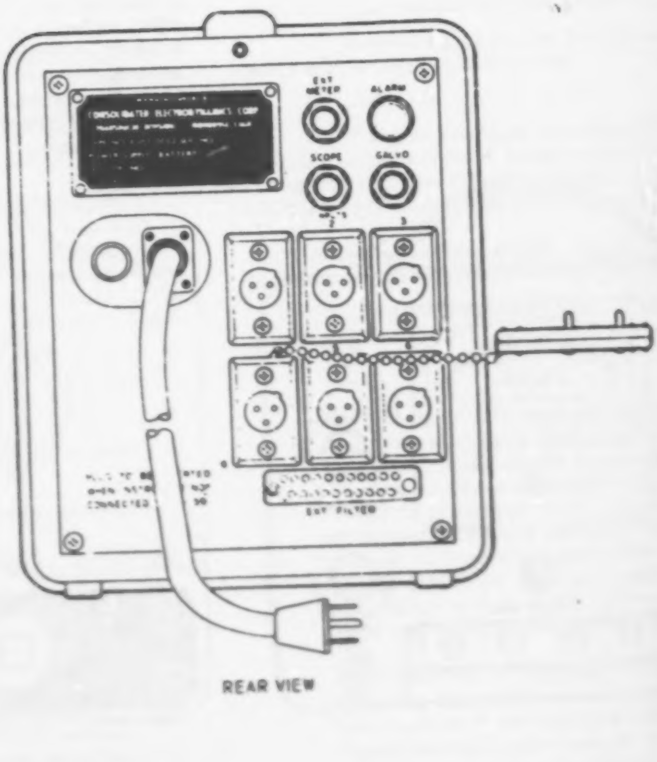


Figure 10-1A. Vibration Spectrum Analyzer-Typical


DISPLACEMENT - MILS PEAK TO PEAK
VELOCITY - 0.1 IPS AVERAGE
CEC
TRANSDUCER DIVISION
VIBRATION METER
SENSITIVITY
CALIB
CONT
BATT
OFF
OUT
SELECTOR
RANGE
1
2
3
4
5
6
OSC LEVEL
CHANNEL SELECTOR

FRONT VIEW


CONSOLIDATED ELECTRODYNAMICS CORP
EXT METER
ALARM
SCOPE
GALVO
EXT FILTER

REAR VIEW

Figure 10-1B. Vibration Meter - Typical

Filter inspection (LTCT484 only). (Refer to raph 10-17A.)

Preliminary vibration spectrum analyzer warm- TCT484 only). (Refer to paragraph 10-17B.)

Operational check of vibration pickups (trans-). (Refer to paragraph 10-17C.)

nstallation of vibration equipment. (Refer to raph 10-17D.)

Adjustment of spectrum analyzer or vibration . (Refer to paragraph 10-17E or 10-17F.)

Vibration test. (Refer to paragraph 10-17G.)

Check of spectrum analyzer. (Refer to para- 10-17H.)

Evaluation of vibration test data. (Refer to raph 10-17J.)

Correcting vibration. (Refer to paragraph 10-18.)

A. Filter Inspection (LTCT484 only). If it is rtain that proper filters are at the proper s, they must be installed as follows:

emove housing.

Plug 70 cps high pass filter, CEC1-003-0070, PUT NETWORK socket number 1.

Plug 200 cps high pass filter, CEC1-003-0200, PUT NETWORK socket number 3.

ecure filters with screws provided.

stall analyzer housing.

B. Preliminary Vibration Spectrum Analyzer -117-0105; LTCT9281) Warmup. Proceed as :

WARNING

following step a., to prevent a possible ard to personnel and damage to equip- nt, set analyzer power switch to OFF ile connecting analyzer to a power rce.

nect spectrum analyzer power lead to suit- e of electrical power (105 to 125 volts, cycles, 30 watts).

h analyzer power switch on, allow approx- 1/2 hour for temperature to stabilize within er.

Operational Check of Vibration Pickups ers). Proceed as follows:

CAUTION

Handle vibration pickups with care. If a pickup is dropped, or struck with force, its accuracy may be impaired.

a. While the indicator is warming up, lay out three cable assemblies (CEC49657-0300 or LTCT9283-02) and three vibration pickups (CEC4-118-0107; LTCT 9282, or CEC4-128-0101).

CAUTION

Do not intermix transducers. Use either three each (CEC4-118-0107 or LTCT9282) or three each (CEC4-128-0101) transducers. The sensitivity settings differ with each type and, therefore, they cannot be intermixed.

b. Connect cables to pickups and to proper CHANNEL receptacle in vibration meter or spectrum analyzer.

c. The following steps (1) through (6) apply to spectrum analyzer (CEC1-117-0105; LTCT9281).

(1) Set INPUT NETWORK selector to OUT.

(2) Set OPERATION selector to Dx1.0.

(3) Set CHANNEL selector to 1.

(4) Set RANGE selector to 5.

(5) Shake number 1 pickup by hand while observing analyzer. The indicator should jog or show a slight movement.

NOTE

If the indicator does not move, check condition of pickup, connectors, cable, and analyzer receptacle. Interchange components until the defective unit is found. Replace defective component.

(6) Set CHANNEL selector to 2, then to 3, and using same procedures, check operation of remaining pickups.

d. The following steps (1) through (6) apply to vibration meter (CEC1-157-0103; LTCT22031-01):

NOTE

The vibration meter contains an internal plug-in power supply (ac). The ac power supply may be wired for high or low voltage by changing the transformer strapping from the 115V range to the 230V range. A battery (18 vdc) power supply is also included in the vibration test set (LTCT20596).

(1) Connect vibration meter to power source to be used. (If batteries are not to be used.)

(2) Ensure that connector plug at rear of vibration meter chassis is inserted into the external filter receptacle.

(3) Set SELECTOR switch to OUT position.

(4) Depress CHANNEL selector 1.

(5) Set MODE switch (inner part of RANGE switch) to D (displacement) position.

(6) Set RANGE switch to 5.

(7) Shake number 1 pickup by hand while observing meter indication. The indicator should jog or show slight movement.

NOTE

If the indicator does not move, check position of pickup, connectors, cable, and analyzer receptacle. Interchange components until the defective unit is found. Replace defective component.

(8) Repeat the preceding steps for the remaining CHANNELS (2, 3) in use.

10-17D. Installation of Vibration Equipment. Proceed as follows.

NOTE

In following step a., cable and pickup to CHANNEL 1 will connect to front lifting eye adapter. Cable and pickup to CHANNEL 2 will connect to diffuser flange adapter. Cable and pickup to CHANNEL 3 will connect to oil scavenge line adapter, or to No. 3 and 4 bearing oil strainer housing adapter on T53-L-15/701 engines only.

In following step a., on T53-L-15/701 engines, adapter (LTCT6756) is used as an alternate to the oil scavenge adapter for certain airframe applications.

a. Secure transducer mounting adapters to required engine mounting locations. (See figures 10-1C and 10-1D.)

b. Secure each pickup to its adapter with three 4-40 screws and suitable lockwashers.

CAUTION

In following step c., leave enough slack in cables to prevent unnecessary strain on pickups and connectors. Avoid conditions that would cause cables to deteriorate from heat or abrasion.

NOTE

Identify adapter and cable connections with numbers or colors to make certain that pickups will be connected to proper meter CHANNEL receptacles.

c. Connect proper cable to each pickup.

d. Secure cable assemblies to engine and aircraf with tape or cord.

WARNING

In following step e., to prevent a possible hazard to personnel and damage to equipment, set meter power switch to OFF while breaking or making connection to a source of electrical power.

e. Disconnect spectrum analyzer (CEC1-117-010 LTCT9281) from source of power used for prelimin meter warmup, and immediately connect it to aircr electrical power (105 to 125 volts, 50/60/400 cycles 30 watts).

f. Secure vibration meter or spectrum analyzer with bungee cord (shock cord), or other suitable me to a cushioned, protected location in aircraft cabin.

NOTE

To prevent cooling off of the vibration meter, it must not be without a source of power for more than a few minutes.

g. Connect cable assemblies to proper CHANNE receptacles.

10-17E. Adjustment of Vibration Spectrum Analyze (CEC1-117-0105; LTCT9281). Proceed as follows:

a. Set OPERATION selector to C. Vibration analyzer indicator should swing toward right-hand of scale.

NOTE

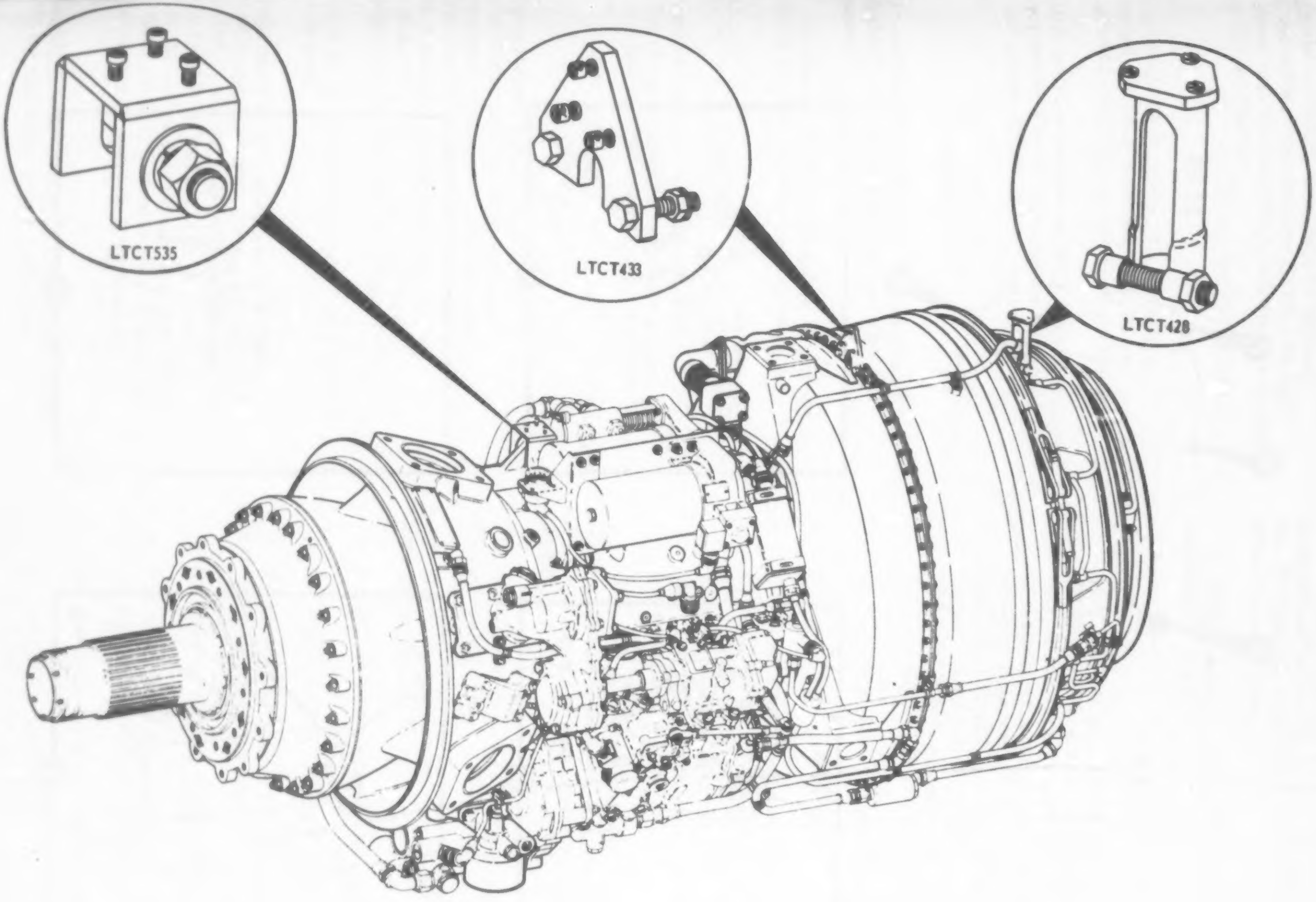
With OPERATION selector set at C, the INPUT NETWORK selector and RANGE selector may be in any position.

b. Set CHANNEL selector to 1.

c. Push in CALIBRATE SIGNAL control. Turn analyzer indication is 10.5 for the CEC4-118-0107 LTCT9282 transducers or 6.0 for the CEC4-128-0 transducer. Read on the 0 to 15 scale.

d. Release CALIBRATE SIGNAL control caref without turning.

e. Open panel below CALIBRATE SIGNAL cont to expose SENSITIVITY controls.


LTCT535
LTCT433
LTCT428

AV 081068
X-854

Figure 10-1C. Location of Vibration Transducer Adapters (T53-L-7/7A)

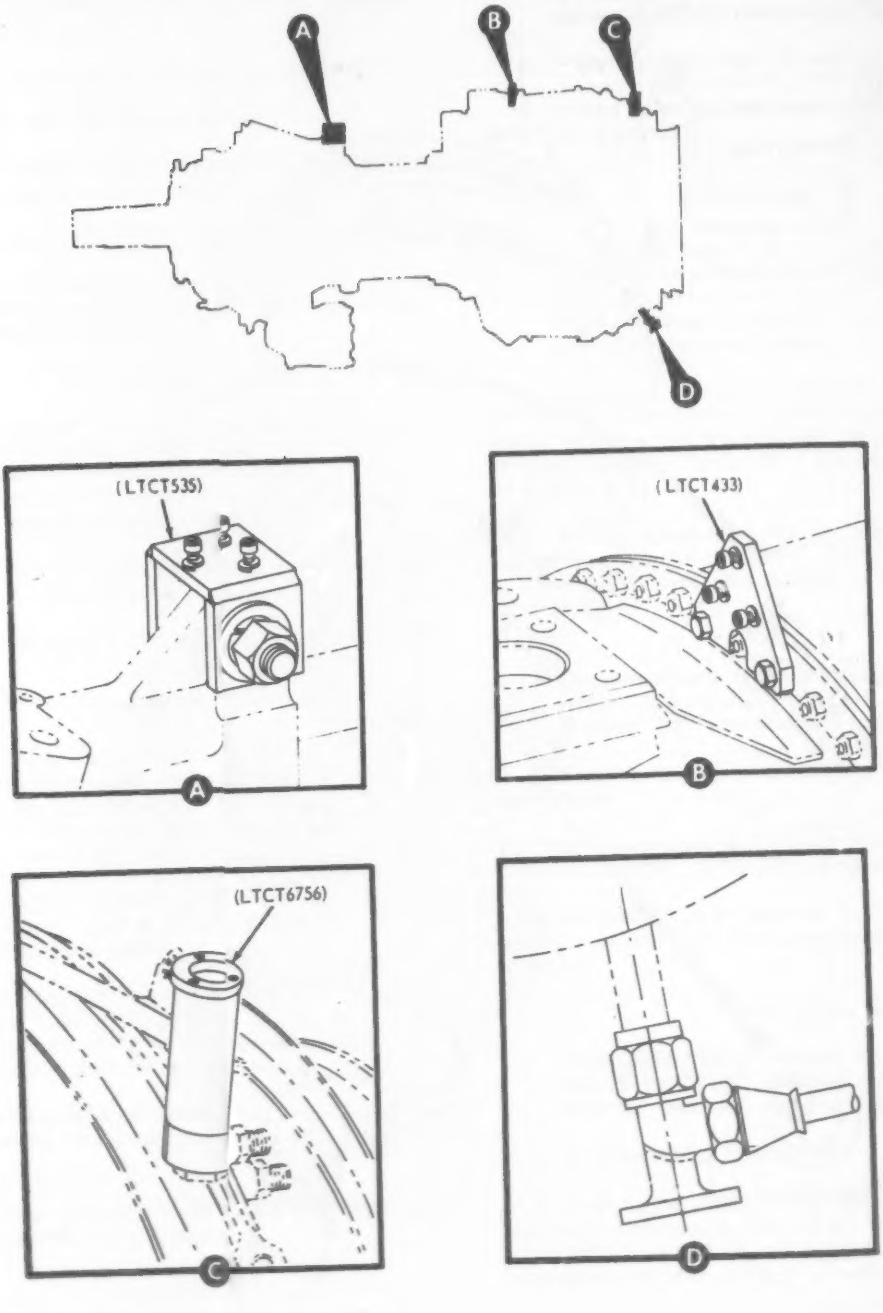

A
B
C
D
(LTCT535)
A
(LTCT433)
B
(LTCT6756)
C
D

Figure 1-1D. Location of Engine Vibration Adapters (T53-L-15/701)

f. Turn SENSITIVITY control for CHANNEL 1 to in analyzer indication of 15.0.

g. Confirm proper adjustment of CHANNEL 1 by ing in and releasing CALIBRATE SIGNAL trol, while observing analyzer CEC4-118-0107 consistent indications of 10.5, and 15.0 or 6.0 for lyzer, CEC4-128-0101.

NOTE

If an indication of 10.5 or 15.0 cannot be obtained vibration analyzer must be recalibrated internally by qualified personnel.

h. Obtain analyzer indication of 15.0 for remaining nels by setting CHANNEL selector to proper ber and turning SENSITIVITY control for that nel.

NOTE

Only one setting of 10.5 (or 6.0) made at CHANNEL 1 is necessary for use with all channels.

17F. Adjustment of Vibration Meter (CEC1-157- LTCT22031-01). Proceed as follows.

CAUTION

To ensure accuracy of vibration test, adjust vibration meter using same power source that is to be used during vibration test.

NOTE

If using battery power supply, set SELECTOR switch in OFF position. The battery voltage is sufficient when meter reading on 0 to 5 scale is one volt or greater. Set SELECTOR switch in the BATT position. Again battery voltage must be one volt or greater.

Connect power source to be used (if batteries t to be used).

Check continuity of transducer circuits by g RANGE switch to 500, setting SELECTOR to CONT. position, and depressing selected ls on CHANNEL SELECTOR. If circuit is tory, the meter will read within the green l channel is open, indicator will deflect full When circuit is shorted, indication will be

lace SELECTOR switch to CALIB and adjust VEL for full scale meter deflection.

lace the SELECTOR switch to SENS ADJ.

epress CHANNEL SELECTOR 1 and set the ity control to the 10.5 correct indication on 15 scale for the type of transducer in use. Either 10.5 of 6.0 for the CEC4-118-0107 or the CEC4-128-0101 transducers respectively.

f. Adjust the channel gain potentiometer (the smallest set screw immediately above the CHANNEL SELECTOR) for CHANNEL 1 to obtain a full scale deflection indication.

g. Repeat preceding step e. for the remaining CHANNELS, 2 and 3.

NOTE

It is necessary to adjust the SENSITIVITY control, on CHANNEL 1 only, to the correct setting for the type of transducer in use. This will suffice for the remainder of the channels in use. The CHANNEL GAIN, however, located above the CHANNEL SELECTOR buttons, must be adjusted for each channel in use individually.

10-17G. Vibration Test. Proceed as follows:

NOTE

Check airframe engine mounts for looseness, wear, or insufficient torque before attempting vibration test. Ensure that Marman clamps, inlet screens, exhaust pipe, and all clamps, lines, and hoses are secure.

a. Prepare Engine Vibration Test Data Sheet for engine to be tested by supplying applicable information at the top of the data sheet. (See figures 10-1E and 10-1F.)

b. The following steps c. through g. apply to vibration meter (CEC1-157-0103; LTCT22031-01).

c. If not using batteries, ensure that vibration meter power source is on.

d. Set SELECTOR switch to 200-FILTER position.

e. Set MODE switch to D position.

f. Rotate RANGE switch for maximum on-scale meter deflection (usually 5.0).

g. Depress CHANNEL SELECTOR to CHANNEL 1.

h. The following step i. applies to vibration spectrum analyzer (CEC1-117-0105; LTCT9281).

i. Set spectrum analyzer for the test as follows:

(1) Set INPUT NETWORK selector to proper number for filter to be used as required by data sheet.

(2) Set OPERATION selector to Dx1.0.

(3) Set CHANNEL selector to 1.

(4) Set range selector to 5.

ENGINE VIBRATION TEST DATA SHEET (T58-16/5A)

Engine Serial No. ______________________ (TSN) ______________________

Test Chamber Location ______________________ (TSLO) ______________________

Aircraft Serial No. ______________________ A/C Time ______________________

Test Location ______________________ Date ______________________

Tested By ______________________ Observer ______________________

Engine Passed Test – Accepted ☐ Engine Failed Test ☐

Propeller Shaft rpm (±20 rpm)	Np Speed in Percent (±0.5%)	No. 1 Pickup S/N ______ (200 cps Filter)	No. 2 Pickup S/N ______ (200 cps Filter)	No. 3 Pickup S/N ______ (200 cps Filter)	REMARKS
1350	80	(3.5)	(3.5)	(4.4)	
1500	85	(2.5)	(2.5)	(4.0)	
1600	90	(2.5)	(2.5)	(3.8)	
1660	95	(2.5)	(2.5)	(3.7)	
1670	MAX	(2.5)	(2.5)	(3.7)	

Note: The figures given in parentheses are the maximum permissible engine vibration.

Figure 10-14E. Engine Vibration Test Data Sheet

ENGINE VIBRATION TEST DATA SHEET (T53-L-13/703)

Serial No. ____________ (TSN) ____________

Location ____________ (TSO) ____________

Serial No. ____________ ACC Time ____________

Location ____________ Date ____________

By ____________ Observer ____________

Passed Test—Accepted ☐ Engine Failed Test ☐

Propeller Shaft rpm (±20 rpm)	N1 Speed in Percent (±0.5%)	No. 1 Pickup S/N ______ (200 cps Filter)	No. 2 Pickup S/N ______ (200 cps Filter)	No. 3 Pickup S/N ______ (200 cps Filter)	REMARKS
1000	80	(3.5)	(3.5)	(4.4)	
1200	85	(2.5)	(2.5)	(4.0)	
1450	90	(2.5)	(2.5)	(3.8)	
1600	95	(2.5)	(2.5)	(3.7)	
1670	MAX.	(2.5)	(2.5)	(3.7)	

*The figures given in parentheses are the maximum permissible engine vibration.

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Figure 10-1F. Engine Vibration Test Data Sheet

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j. Operate engine at N1 and N2 speeds shown on data sheet.

k. At each speed setting, record indications in data sheet as follows:

NOTE

> Stabilize engine conditions by maintaining each required engine speed for at least 30 seconds before indications are recorded.

(1) Set INPUT NETWORK selector to proper number for indicator network and filter to be used as required by the data sheet.

(2) Set CHANNEL selector to proper number for indicator channel and pickup to be used as required by the data sheet.

(3) Record indications in proper space on the data sheet.

10-17H. Check of Vibration Spectrum Analyzer (CEC 1-117-0105; LTC 10201). Proceed as follows:

a. Immediately after the last entry is made on the data sheet, set CHANNEL selector to 1.

b. Set OPERATION selector to C. Analyzer indication should be 15.0 on lower scale.

NOTE

> With the OPERATION selector set at C, the INPUT NETWORK selector and RANGE selector may be in any position.

c. Push in CALIBRATE SIGNAL control. Analyzer indication should be 10.5 (or 6.0) depending on type of transducer being used.

d. If analyzer indications of 15.0 and 10.5 (or 6.0) are not obtained, push in CALIBRATE SIGNAL control and turn to obtain indication of 10.5 (or 6.0).

e. Release CALIBRATE SIGNAL control carefully, without turning. Analyzer indications, on lower scale, should be approximately 15.0.

NOTE

> If check after testing discloses that adjustment of the analyzer has changed to indicate less than 14.0, or more than 1/16 inch higher than the full scale readings, it must be assumed that some of the analyzer indications recorded during test were inaccurate. In this case, the entire vibration test must be conducted again. If defective pickups are suspected of producing incorrect analyzer indications, interchange pickups and check their operation with a trial vibration test, conducted at only one combination of N1 and N2 speeds. If comparison with recorded indications on data sheet discloses a defective pickup, the entire test must be conducted again with pickups known to be good.

10-17I. Evaluation of Vibration Test Data. Procee as follows:

a. Compare indications recorded on Engine Vibration Test Data Sheet with figures given in the asterisk column for the maximum permissible engine vibration. If all recorded figures are below the maximum permissible vibration, the engine, as installed, has passed the vibration test.

b. (Deleted)

c. Vibration measures with the 200 cps filter represents engine vibration only. If the recorded indication exceeds the maximum permissible engine vibration figures, corrective action must be taken before the engine is again tested for vibration, prior to acceptance for unrestricted flight.

NOTE

> If any vibration reading exceeds the engine operating limits, this operational point should be repeated. Running at this point, vary N1 while holding a constant N2. Then vary N2 while holding a constant N1. This procedure will isolate any defective engine system.

10-18. CORRECTING VIBRATION. See table 10-4 for vibration sources. Refer to paragraphs 10-19 10-20 for corrective action.

10-19. CORRECTING GAS PRODUCER (N1) VIBRA TION. Proceed as follows:

a. Remove upper half of compressor and impe housing.

b. Using a dial indicator, check concentricity spacer lands, and OD of centrifugal impeller.

(1) Maximum allowable runout of each spac land is 0.003 inch TIR. However, any two lands have a runout of 0.0033 inch TIR.

lication;

maximum allowable runout on centrifugal
is 0.0025 inch TIR.

compressor runouts are exceeded, ship engine
maintenance for corrective action.

compressor runouts are within limits, re-
tor turbine assembly (paragraph 9-44
and check gas producer turbine wheel hub
runouts (paragraph 9-232 or 9-235).

have been exceeded, reseat turbine
paragraph 9-232 or 9-235) and recheck runouts.

Install combustor turbine assembly (para-
graph 9-96) and repeat vibration test.

CORRECTING POWER TURBINE (N2)
ION. Proceed as follows:

Disconnect all fuel, lubrication, and ignition
combustor turbine assembly.

NOTE

following steps, do not remove com-
turbine assembly completely.
it only enough to allow rotation of
turbine rotors without disturbing
of power shaft.

move combustor turbine assembly as outlined
graph 9-44 or 9-50).

CAUTION

Do not use lead pencil when marking power shaft and turbine rotor. Markings on high temperature materials shall only be done with approved marker. (Refer to paragraph 1-32.)

c. Before disengaging power turbine rotors from power shaft, mark power shaft spline and turbine rotor journal to provide an indication for turbine rotor relocation.

d. Rotate power turbine rotors 180 degrees.

e. Install combustor turbine assembly. (Refer to paragraph 9-90 or 9-96.)

f. Start engine and repeat test at point where vibration was discovered.

NOTE

Vibration meter indications will either be within specified limits or will greatly exceed the original readings. If the meter indications are still in excess of specified limits, a second relocation must be accomplished. Perform procedures in following steps h through i.

g. Repeat preceding steps a through c.

Table 10-14. Vibration Sources and Corrective Action

POSSIBLE SOURCE OF EXCESSIVE VIBRATION	CORRECTIVE ACTION
	GENERAL
Inlet	Inspect for foreign object damage
Exhaust and power turbine	Inspect for metal chips or signs of damage incurred while running engine
Airframe engine mounts, inlet screens, clamps, and hoses	Check for proper installation and torque. If necessary, reinstall properly and tighten as required
	GAS PRODUCER (N1) VIBRATION
Foreign object damage in compressor	Inspect inlet guide vane assembly and first stage compressor rotor. If damage exceeds field limits, replace rotor blades as required
Second stage gas producer rotor not within runout limits (T53-L-15/701)	Reposition rotor
First stage turbine rotor not within runout limits	Reposition rotor; clean or replace forward and aft cones
Compressor rotor assembly not within runout limits	Ship engine to depot maintenance
Gas Producer turbine rotors out of balance (T53-L-15/701)	Reposition turbines diametrically in relation to compressor rotor or reposition second rotor in relation to first rotor
No. 1 or 2 bearing worn or defective	Ship engine to depot maintenance or replace defective 2 bearing
	POWER TURBINE (N2) VIBRATION
Loose V-band assembly clamp or exhaust pipe	Check for proper installation; tighten as required
Power shaft bolt not properly installed	Check that power shaft bolt is properly installed; tighten as required
Loose propeller shaft thrust nut	Tighten nut to proper torque
Power shaft out of balance	Ship engine to depot maintenance
Damaged internal threads on power shaft	Ship engine to depot maintenance
Power turbine rotor improperly located	Relocate in relation to power shaft
Power turbine rotor to power turbine cylinder clearance is low, causing rub (T53-L-7/7A)	Replace cylinder
No. 3 or 4 bearing worn or defective	Replace defective bearing
Combustion chamber to support cone pilot diameter out-of-squareness of concentricity	Replace part
Second stage power turbine rotor assembly not within runout limits or out of balance	Replace rotor assembly

Table 10-4. Vibration Sources and Corrective Action (Cont)

POSSIBLE SOURCE OF EXCESSIVE VIBRATION	CORRECTIVE ACTION
POWER TURBINE (N2) VIBRATION (Cont)	
st stage power turbine rotor not within t limits or out of balance (T53-L-15/701)	Reposition rotor in relation to second stage power turbine
st stage power turbine bolts and tab-hers	Check that all are of the same weight
t turbine rotor to power turbine cylinder nce is low, causing rub (T53-L-15/701)	Replace parts

ate power turbine rotors 90 degrees.

NOTE

e engine does not operate within cified vibration limits following p i, relocate the power turbine(s) n additional 180 degrees. If the en- e fails to check out following the rd relocation, ship engine to depot ntenance.

peat preceding steps e. and f.

GROUND TESTING OF ENGINE USING MO- TRAILER ASSEMBLY. The following instruc- r ground testing to determine flight readi- engine after maintenance. Ground opera- testing, of an engine will be performed on a trailer assembly (LTC 1744 or TE 12062). ction also includes specific component checks, erational and visual, that must be performed. obile trailer assembly provides engine testing s similar to those available in an engine test The mobile trailer assembly increases engine ility by eliminating most of the need to return to depot maintenance for testing. For all in- n on the mobile trailer assembly and instal- engine on the trailer, refer to TM 55-4920- 5. During engine testing, observe all testing nts and operating limits.

GENERAL.

Paragraphs 10-24 through 10-33 contain gen- formation required for testing models T53-L- /701 engines, after maintenance and before stalled in the aircraft. Paragraph 10-35 con- structions for testing the engine.

Atmospheric Conditions. The performance rbine engines is affected by barometric and ambient air temperature. Because it ctical to provide values for all prevailing heric conditions, performance ratings at rd day sea level conditions are given. These mance ratings are provided in tables 10-5, 10-7.

NOTE

An outside air temperature of 59°F, and a barometric indication of 29.92 inches Hg are to be considered standard day sea level conditions.

10-25. Graph Reading. To read any graphs presented in following paragraphs, proceed as follows:

a. Locate applicable unit at bottom or side of graph.

b. Project vertically or horizontally, as required, from this unit and intersect applicable line drawn on graph.

c. Project horizontally or vertically to left or bottom from point of intersection and read result.

10-26. Power Measurement. The primary power measurement shall be based upon a positive torque indication from a strain-gaged water brake assembly torque system. Should this system be inoperative or unavailable, a calibrated test propeller may be used on the T53-L-7/7A engines only.

10-27. Formulas and Calculation Methods. Use following formulas and methods to perform all calculations.

a. To determine compensated shaft horsepower, locate existing ambient temperature in figures 10-2, 10-3, or 10-4. Follow upward to power level curve desired. Read compensated shaft horsepower at left.

b. To determine compensated fuel flow, proceed as follows:

(1) Obtain total engine operating time from engine log.

(2) Refer to appropriate graph and locate existing ambient temperature. (See figure 10-5 for T53-L-7/7A, figure 10-6 for T53-L-15, or figure 10-7 for T53-L-701.)

(3) Follow upward to power level desired. Read compensated fuel flow at left.

Table 10-5. Performance Ratings at Standard Day Sea Level Conditions (T53-L-7/7A)

POWER RATING	SHAFT HP (MIN)	COMPRESSOR ROTOR RPM (MAX)	PROPELLER SHAFT RPM (MAX)	RAM POWER SHP (MAX)	RATED EXHAUST TEMP °F
Takeoff	1100	24,700	1700		1140
Military	1000	24,220	1700	1150	1110
Normal	900	23,670	1700	980	1050
90% Normal	810	23,220	1700		
75% Normal	675	22,520	1530		
Flight Idle*	110 max	17,100	0-1720		
Ground Idle*	35 max	11,110	0-1720		

*Values apply when interstage air bleed is in the open position.

Table 10-6. Performance Ratings at Standard Day Sea Level Conditions (T53-L-11)

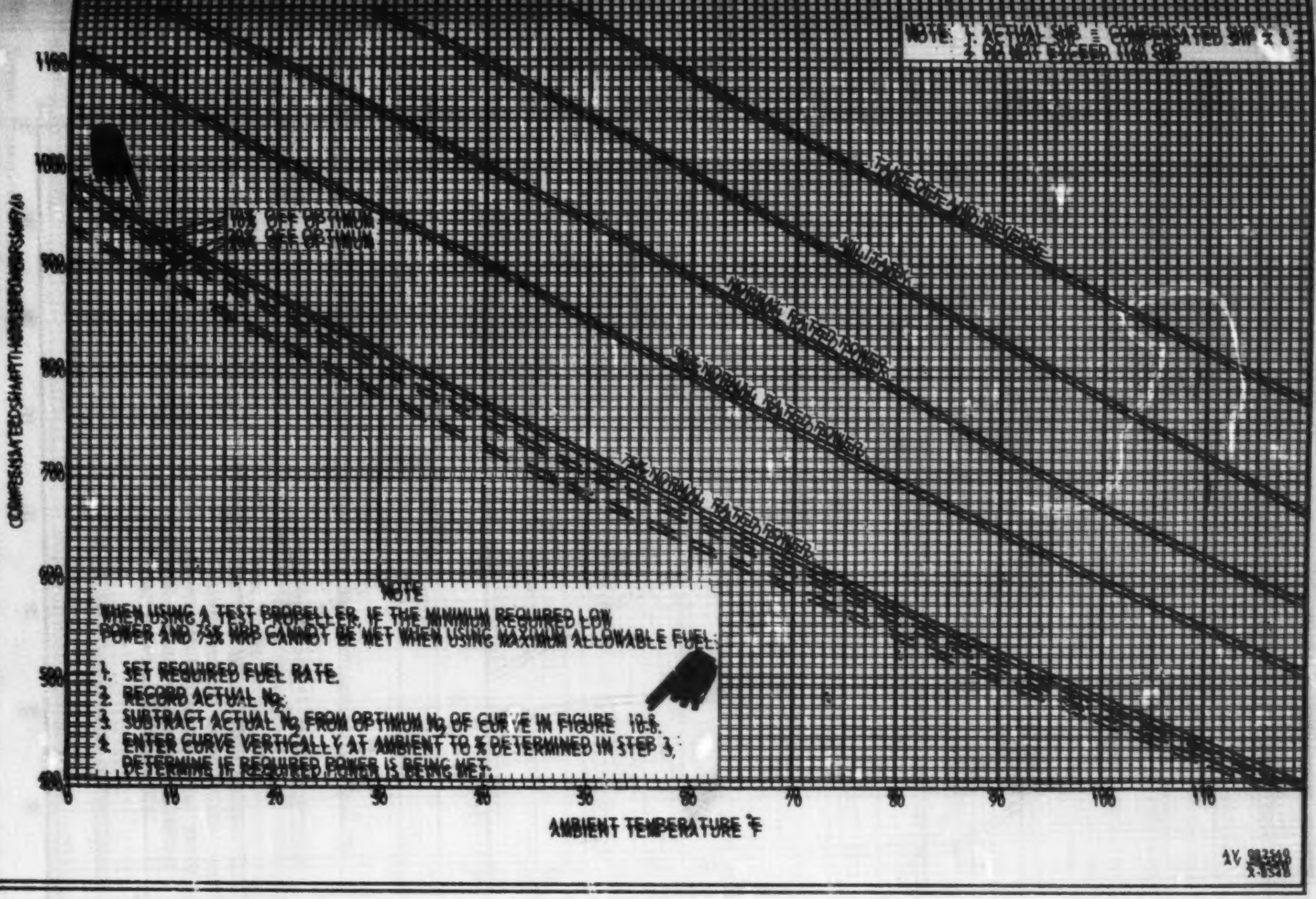
POWER RATING	SHAFT HP (MIN)	COMPRESSOR ROTOR RPM (MAX)	PROPELLER SHAFT RPM	RAM POWER SHP (MAX)	RATED EXHAUST TEMP °F
Military	1150	24,400	1700	1150	1075
Normal	1000	23,740	1600	1000	1040
90% Normal	900	23,300	1440		
75% Normal	750	22,700	1332		
Flight Idle*	130 max	17,100			
Ground Idle*	40 max	13,100			

*Values apply when interstage air bleed is in the open position.

Table 10-7. Performance Ratings at Standard Day Sea Level Conditions (T53-L-701)

POWER RATING	SHAFT HP (MIN)	COMPRESSOR ROTOR RPM (MAX)	PROPELLER SHAFT RPM	RAM POWER SHP (MAX)	RATED EXHAUST TEMP °F
Military	1400	25,400	1650	1550	1114
Normal	1250	24,900	1580	1400	1081
90% Normal	1125	24,500	1540		
75% Normal	938	23,850	1460		
Flight Idle*	130 max	17,100			
Ground Idle*	40 max	13,100			

*Values apply when interstage air bleed is in the open position.



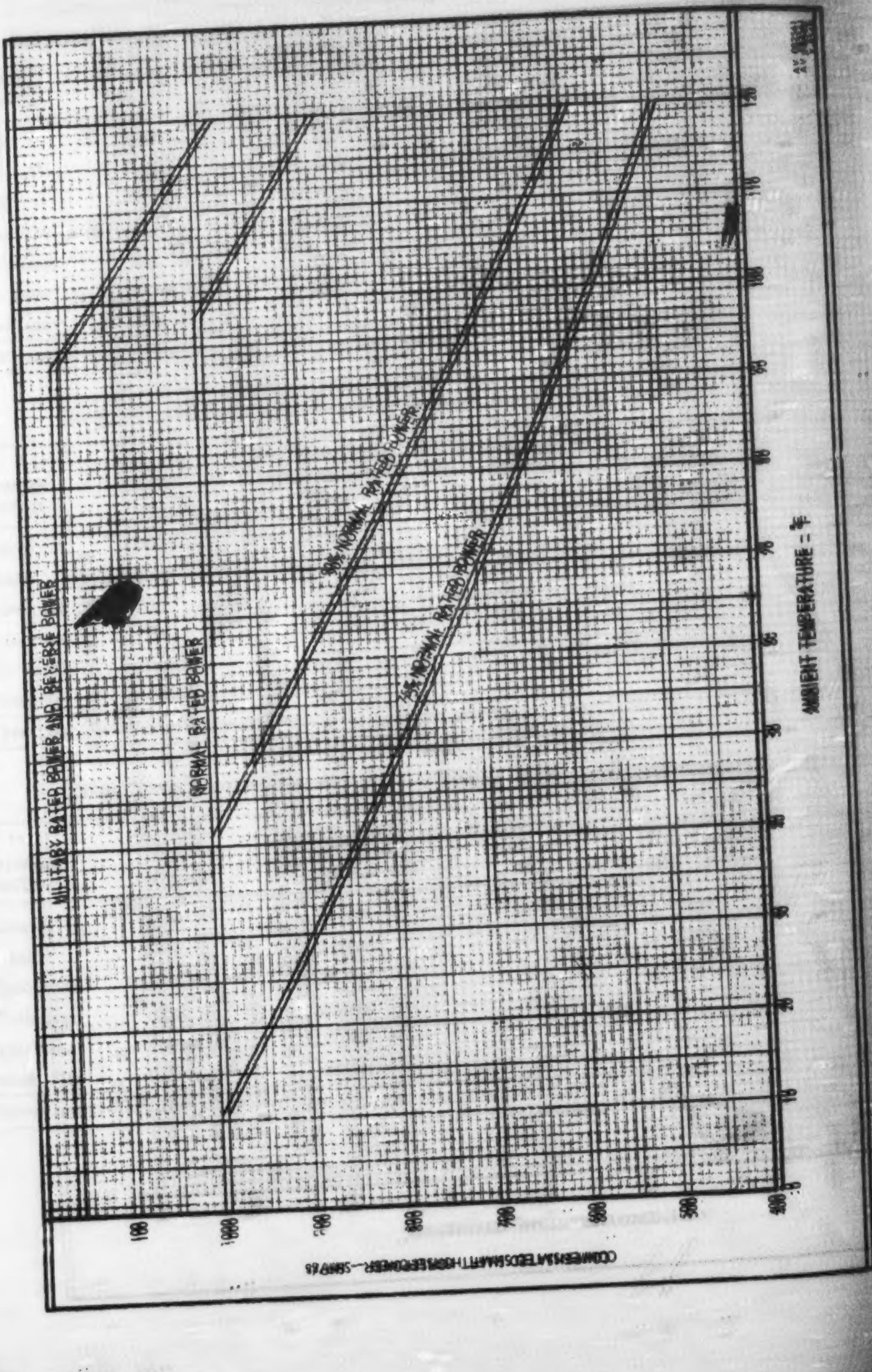
NOTE: 1. ACTUAL SHP = COMPENSATED SHP x δ
2. DO NOT EXCEED 1100 SHP

NOTE

WHEN USING A TEST PROPELLER, IF THE MINIMUM REQUIRED LOW POWER AND 75% NRP CANNOT BE MET WHEN USING MAXIMUM ALLOWABLE FUEL:

1. SET REQUIRED FUEL RATE.
2. RECORD ACTUAL N_2.
3. SUBTRACT ACTUAL N_2 FROM OPTIMUM N_2 OF CURVE IN FIGURE 10-8.
4. ENTER CURVE VERTICALLY AT AMBIENT TO % DETERMINED IN STEP 3, DETERMINE IF REQUIRED POWER IS BEING MET.

Figure 10-4. Compensated Shaft Horsepower Versus Ambient Temperature (T53-L-7/7A)


MILITARY RATED POWER AND REVERSE POWER
NORMAL RATED POWER
90% NORMAL RATED POWER
75% NORMAL RATED POWER
CONVERTED SHAFT HORSEPOWER — SHP/δ√θ
1100
1000
900
800
700
600
500
400
AMBIENT TEMPERATURE — °F
0
10
20
30
40
50
60
70
80
90
100
110
120

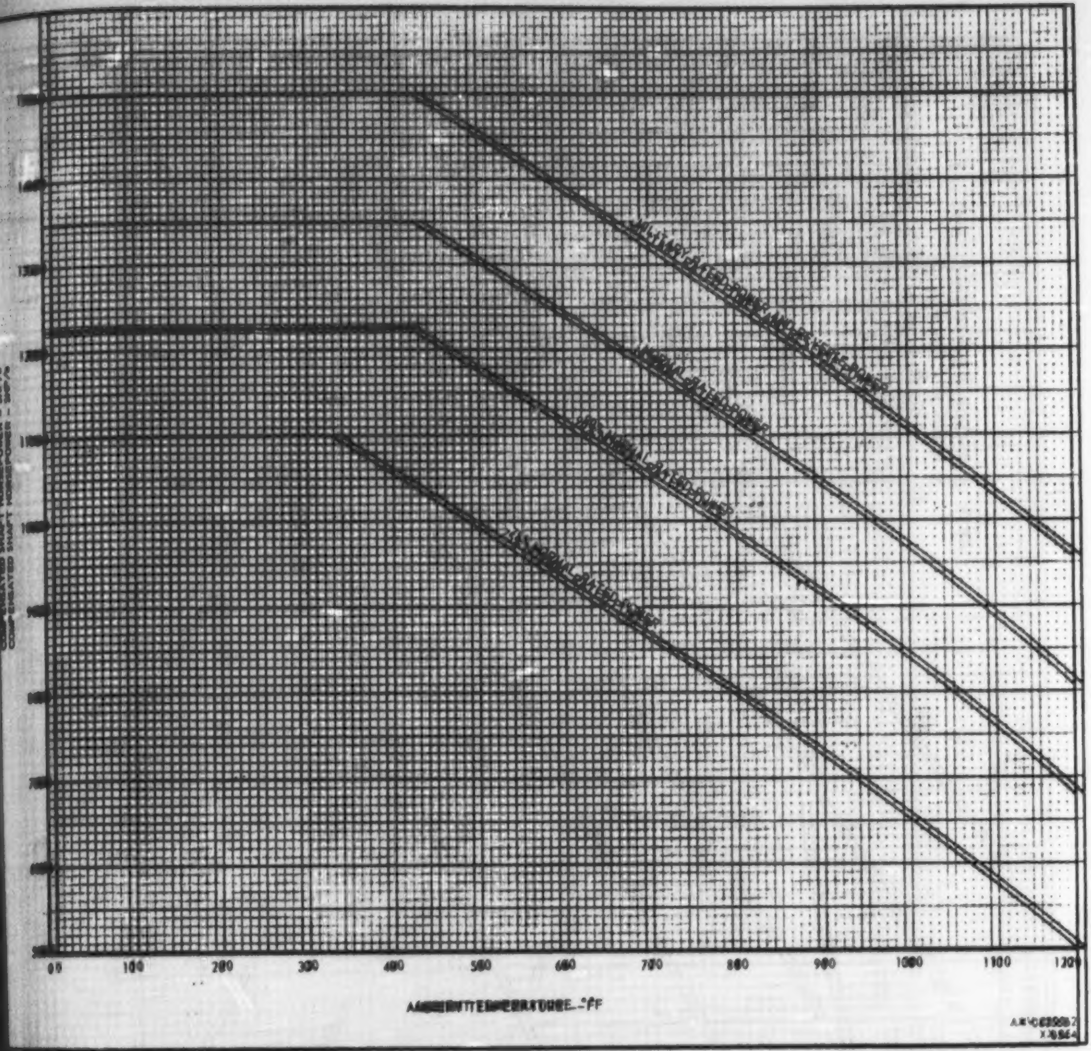


Figure 10-41. Compensated Shaft Horsepower Versus Ambient Temperature (T53-L-701)

...termine actual shaft horsepower or field ...y compensated value obtained in preced- ...ara. or b. by appropriate compensation factor ...table 10-68 for prevailing atmospheric condi-...

...termine shaft horsepower (SHP) from test ...ditions, use following formula.

...If torque indication is read or computed in ...(for applicable power turbine N2 speed), ...10-68, 10-69, or 10-110):

$$SHP = \frac{\text{Torque (pound-feet)} \times \%\ N2\ RPM}{309}$$

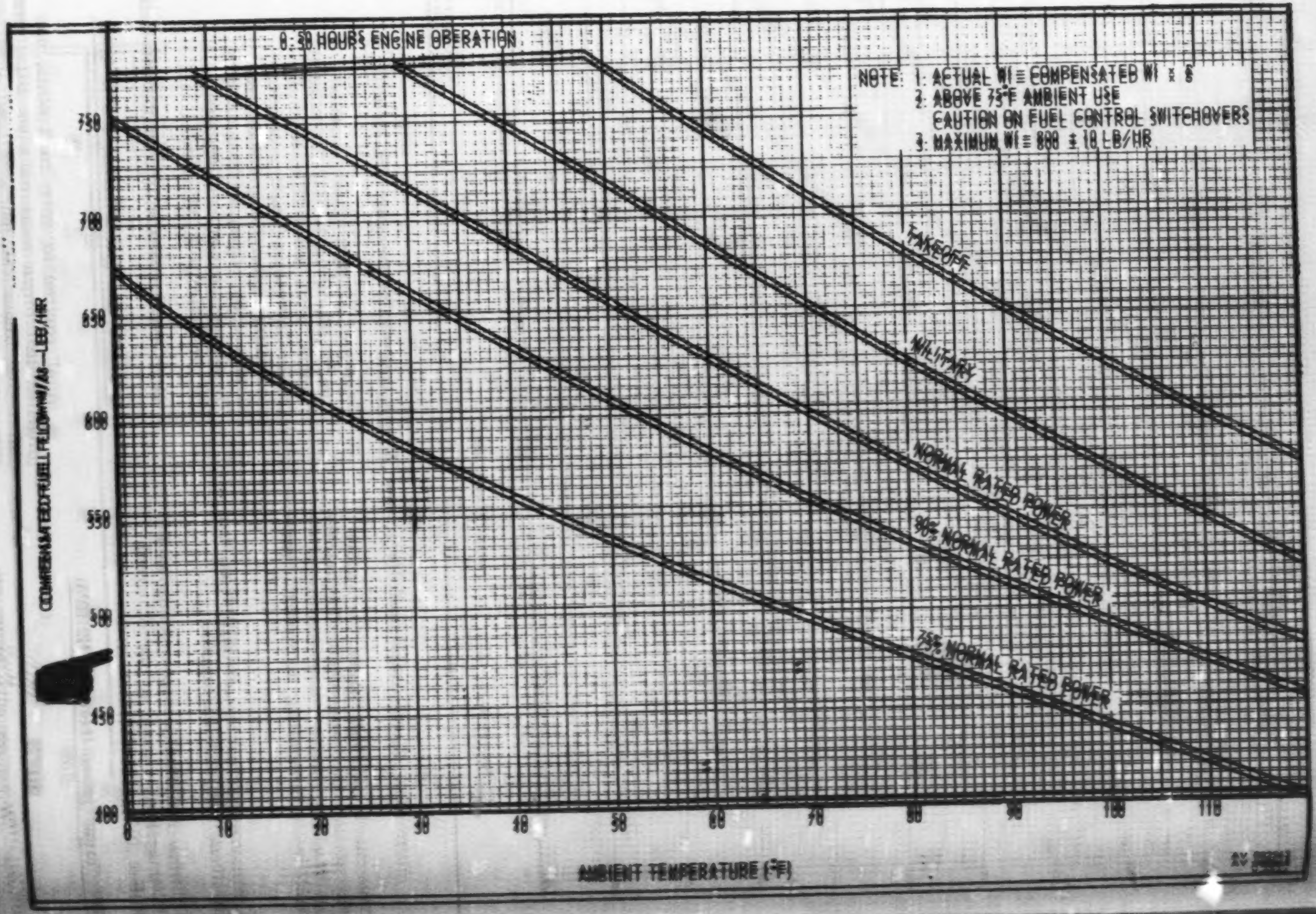
NOTE

...T53-L-7/7A engines only, torque can ...ined using load curve (Propeller Calibration Chart) of test propeller used. (See figure 10-111) To calculate torque, locate actual N2 speed on Propeller Calibration Chart; project to prevailing ambient temperature, read compensated torque, and then multiply by appropriate compensating factor (δ) as indicated in table 10-68.

(2) If torque indication is read in pound-inches:

$$SHP = \frac{\text{Torque (pound-inches)} \times \%\ N2\ RPM}{3711}$$

e. At all required log entry check points, plot propeller shaft torque measured in pound-feet versus differential torquemeter indication (read in psi for T53-L-7/7A/15 engines) or pound-feet versus milliamps (read in percent of torque for T53-L-701 engines).


0-50 HOURS ENGINE OPERATION
NOTE: 1. ACTUAL Wf = COMPENSATED Wf x δ
2. ABOVE 75°F AMBIENT USE
CAUTION ON FUEL CONTROL SWITCHOVERS
3. MAXIMUM Wf = 800 ± 10 LB/HR
TAKEOFF
MILITARY
NORMAL RATED POWER
90% NORMAL RATED POWER
75% NORMAL RATED POWER
COMPENSATED FUEL FLOW—Wf/δ—LB/HR
750
700
650
600
550
500
450
400
0
10
20
30
40
50
60
70
80
90
100
110
AMBIENT TEMPERATURE (°F)

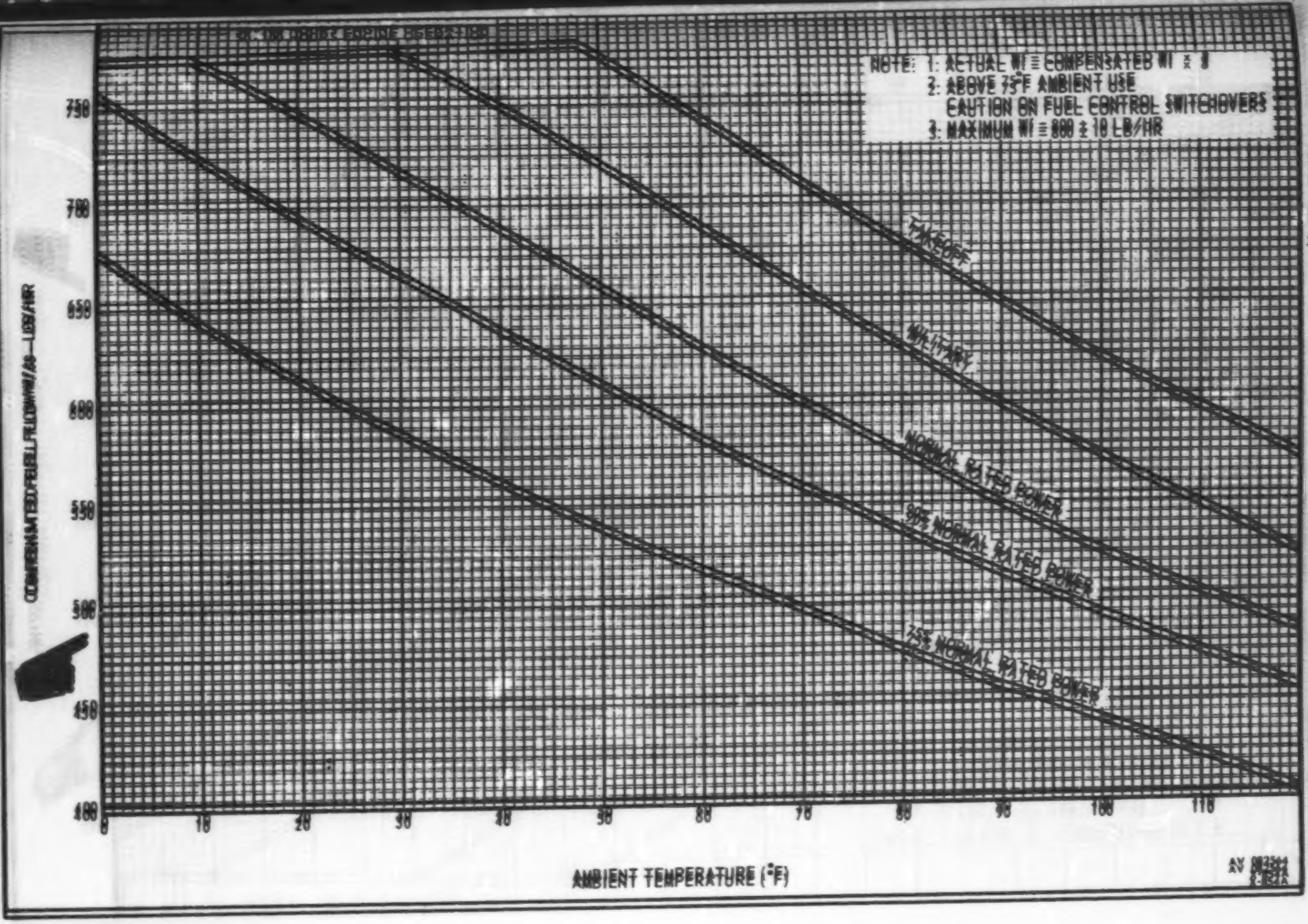
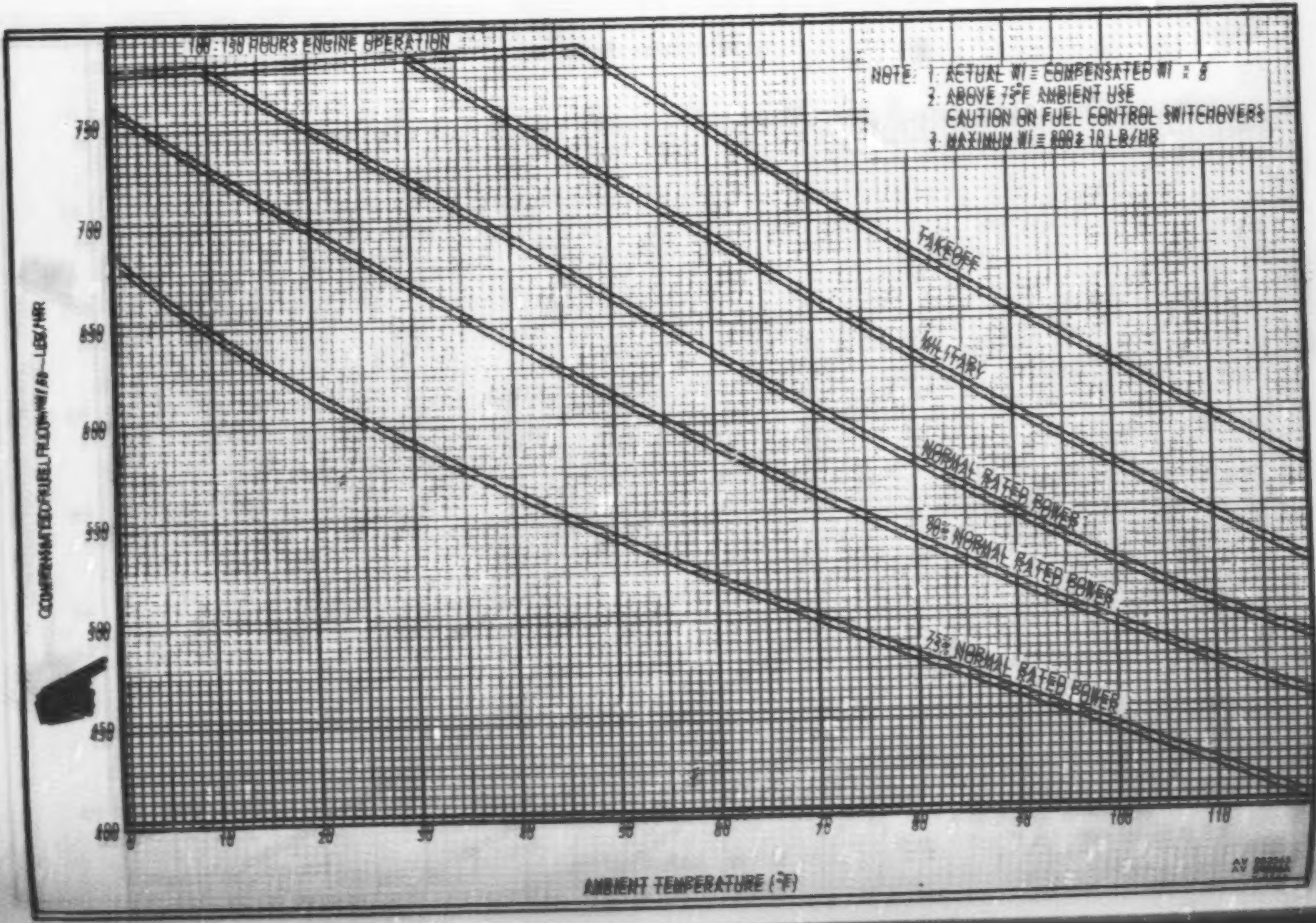


Figure 10-5: Compensated Fuel Flow Versus Ambient Temperature (T53-L-7/7A) (Sheet 2 of 4)


100 - 150 HOURS ENGINE OPERATION
NOTE: 1. ACTUAL Wf = COMPENSATED Wf × δ
2. ABOVE 75°F AMBIENT USE
CAUTION ON FUEL CONTROL SWITCHOVERS
3. MAXIMUM Wf = 800 ± 10 LB/HR
TAKEOFF
MILITARY
NORMAL RATED POWER
90% NORMAL RATED POWER
75% NORMAL RATED POWER
COMPENSATED FUEL FLOW—Wf/δ—LB/HR
400
450
500
550
600
650
700
750
0
10
20
30
40
50
60
70
80
90
100
110
AMBIENT TEMPERATURE (°F)
AV 003243

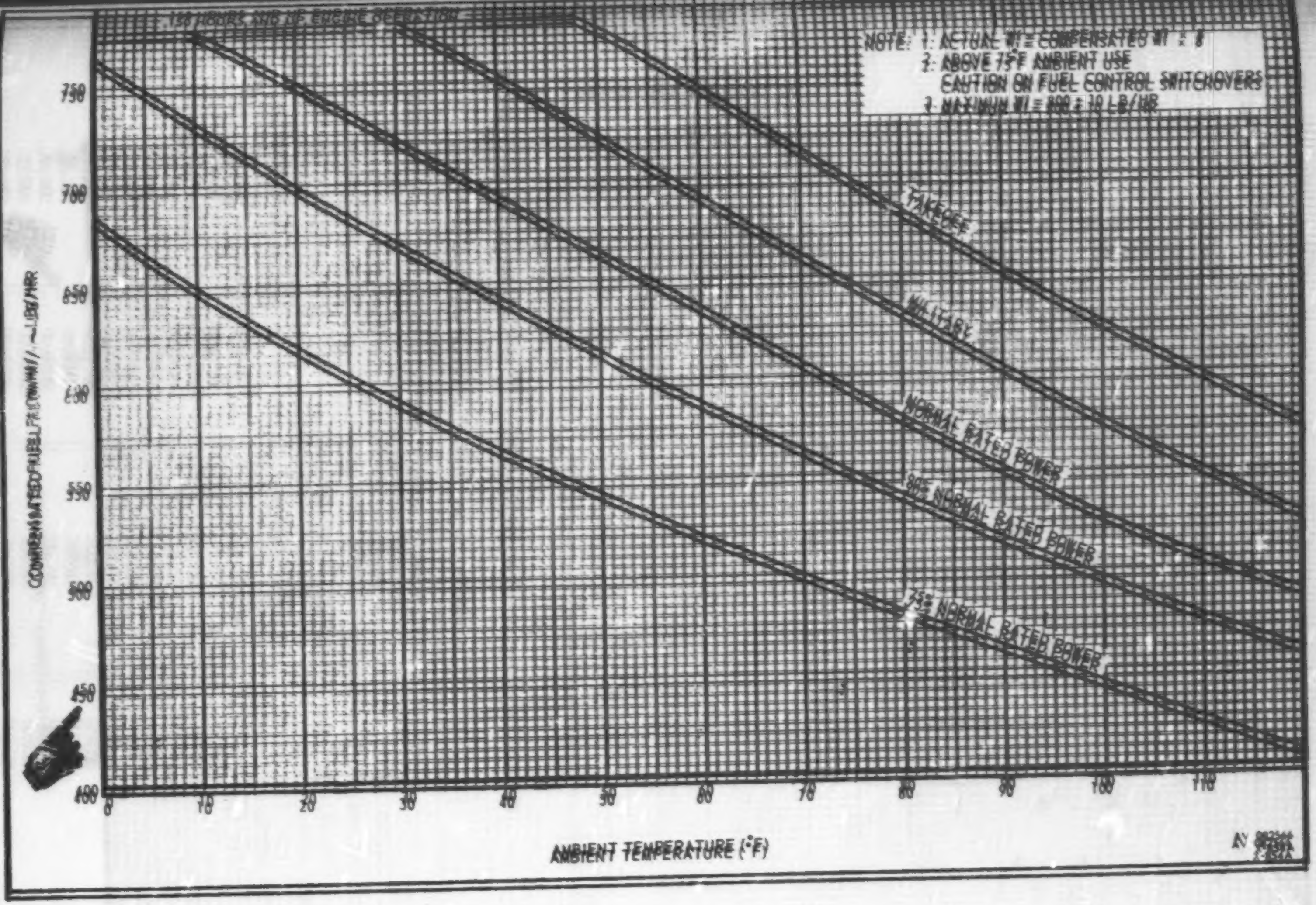
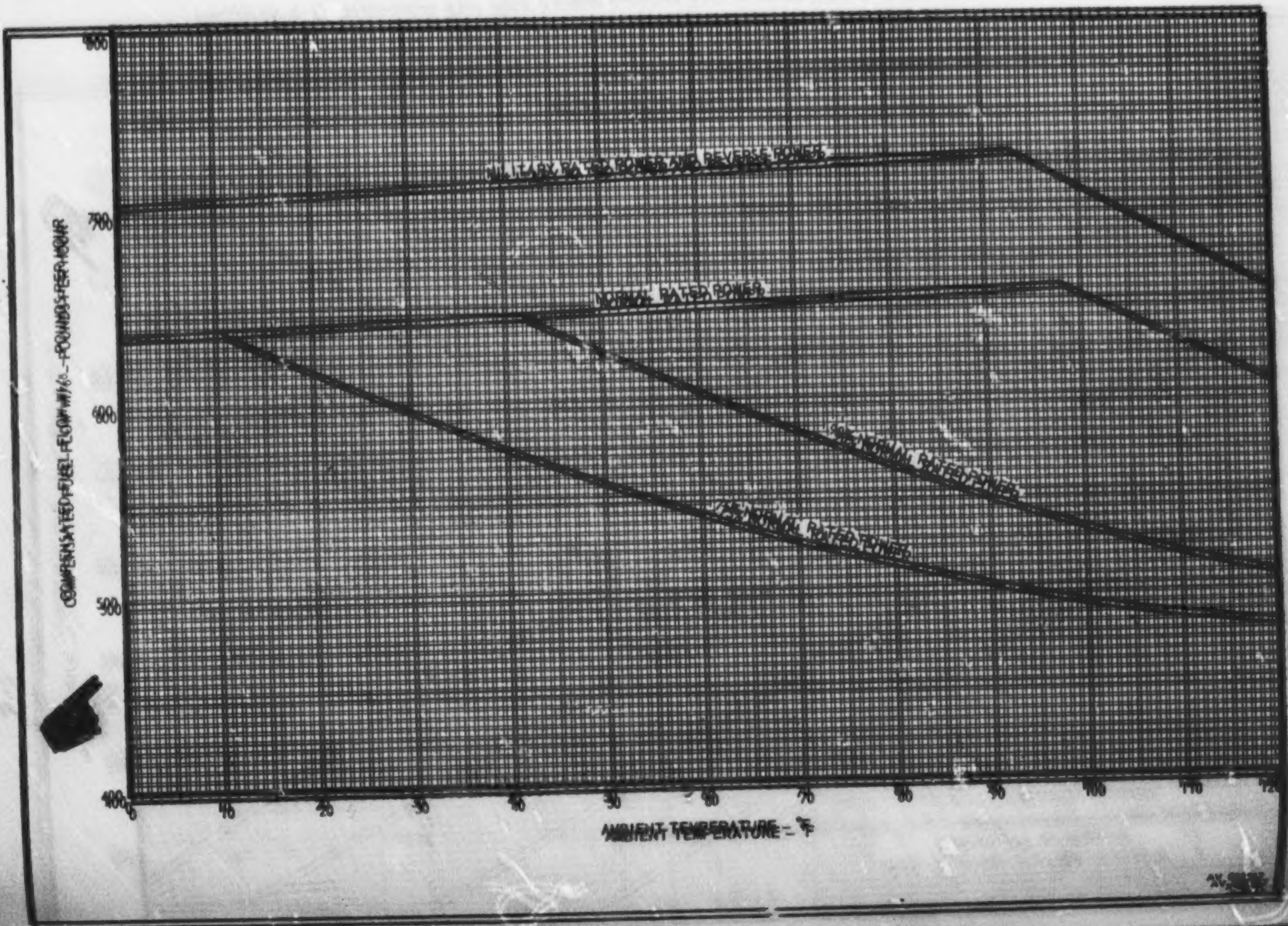


Figure 10-5: Compensated Fuel Flow Versus Ambient Temperature (T53-L-7/7A) (Sheet 4 of 4)


MILITARY RATED POWER AND REVERSE POWER
NORMAL RATED POWER
90% NORMAL RATED POWER
75% NORMAL RATED POWER
COMPENSATED FUEL FLOW Wf/δ — POUNDS PER HOUR
400
500
600
700
800
AMBIENT TEMPERATURE — °F
0
10
20
30
40
50
60
70
80
90
100
110
120

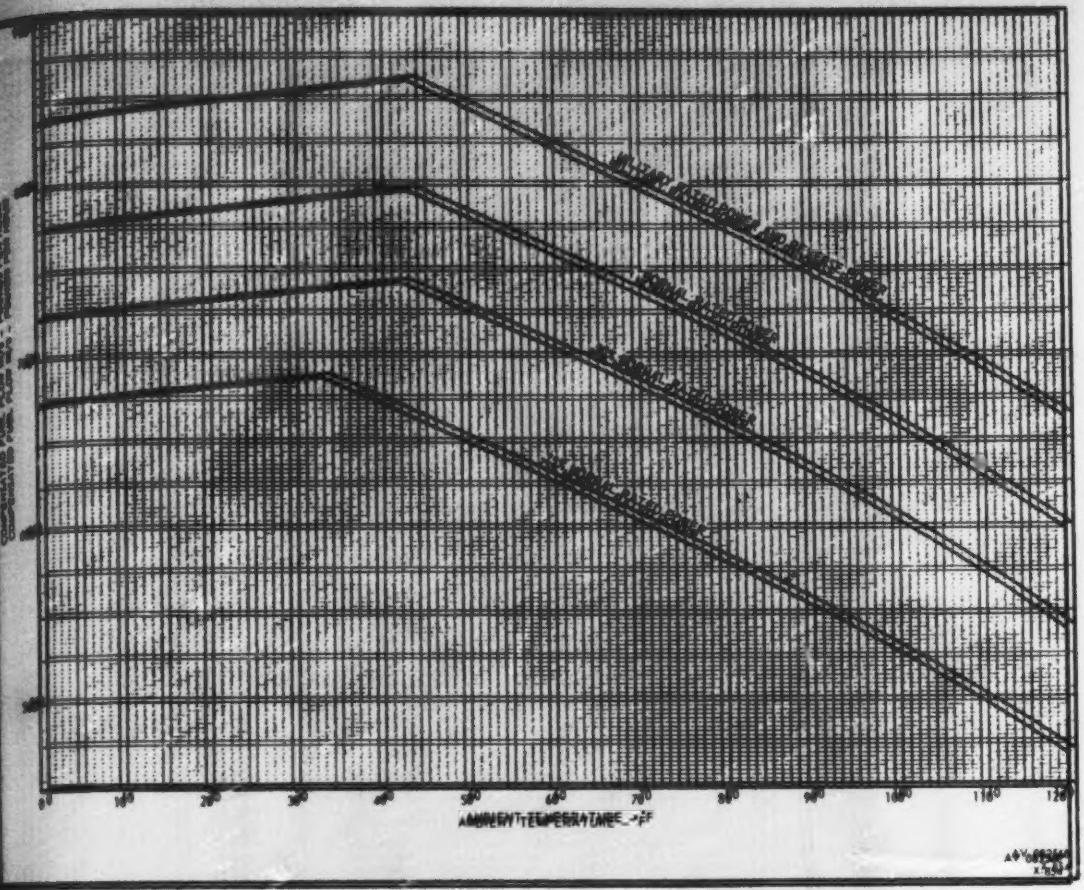
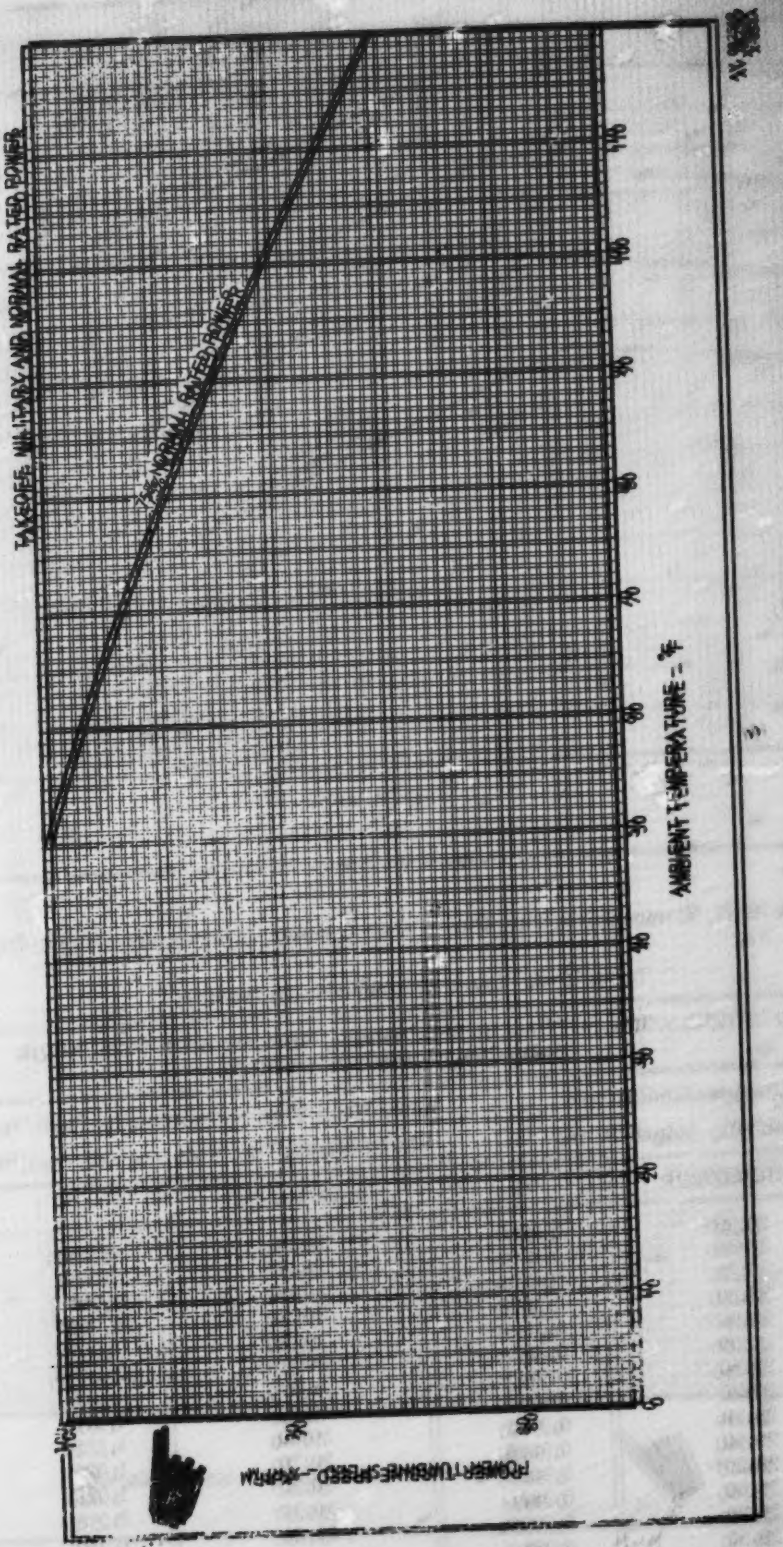


Figure 10-7. Compensated Fuel Flow Versus Ambient Temperature (T53-L-701)

Table 10-8. Table of Compensating Factors

FOR CALCULATING ACTUAL HORSEPOWER, TORQUE, AND FUEL FLOW FROM COMPENSATED VALUES			
Actual HP = Compensated HP x δ Compensated HP = Actual HP / δ		Actual Fuel Flow = Compensated Fuel Flow x δ Compensated Fuel Flow = Actual Fuel Flow / δ	
BAROMETER	δ	BAROMETER	δ
28.50	0.953	29.90	0.999
28.60	0.956	29.92	1.000
28.70	0.959	30.00	1.003
28.80	0.963	30.10	1.006
28.90	0.966	30.20	1.009
29.00	0.969	30.30	1.013
29.10	0.973	30.40	1.016
29.20	0.976	30.50	1.019
29.30	0.979	30.60	1.023
29.40	0.983	30.70	1.026
29.50	0.986	30.80	1.029
29.60	0.989	30.90	1.033
29.70	0.993	31.00	1.036
29.80	0.996		


TAKEOFF, MILITARY AND NORMAL RATED POWER
75% NORMAL RATED POWER
POWER TURBINE SPEED – %RPM
100
90
80
AMBIENT TEMPERATURE – °F
0
10
20
30
40
50
60
70
80
90
100
110

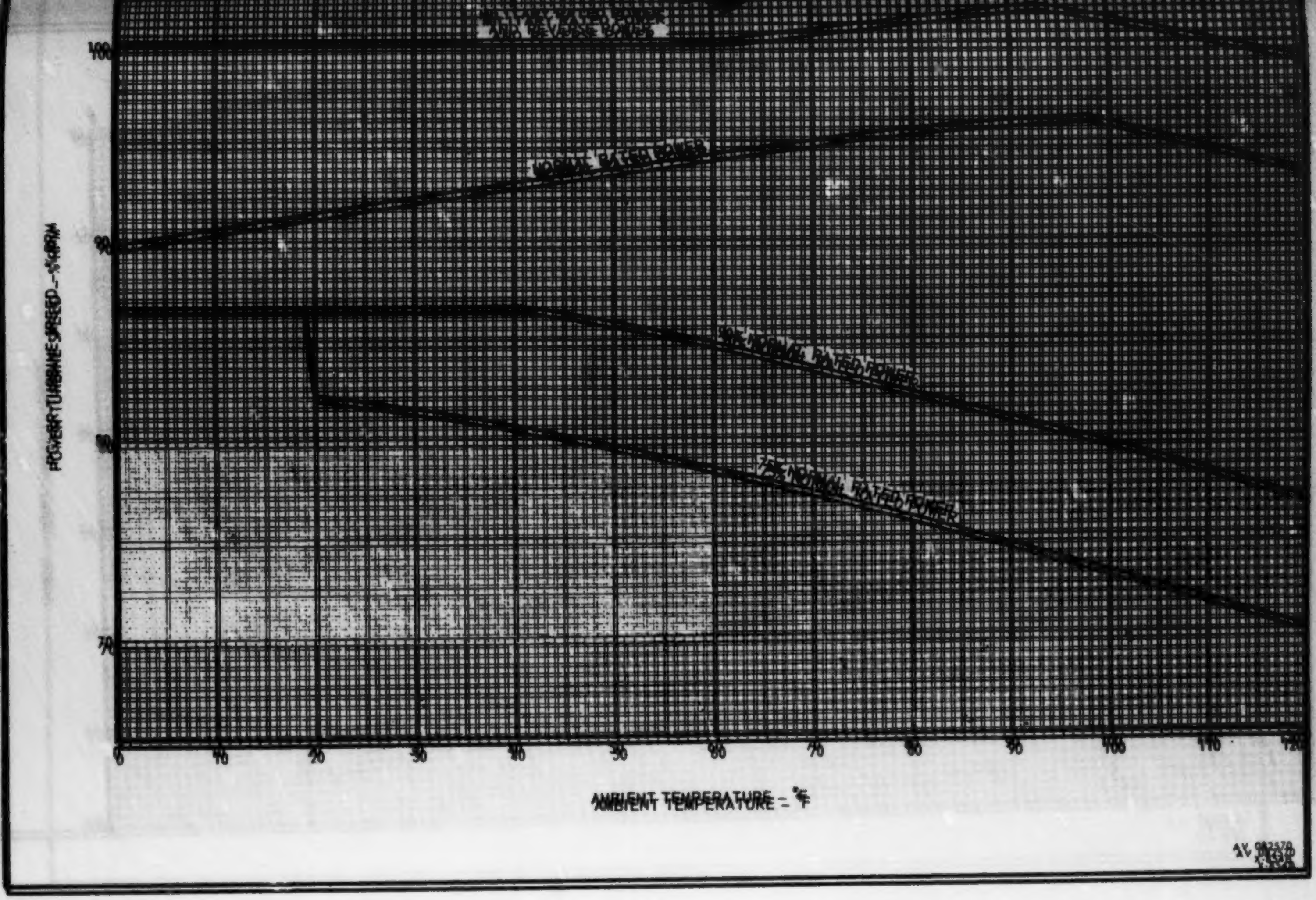
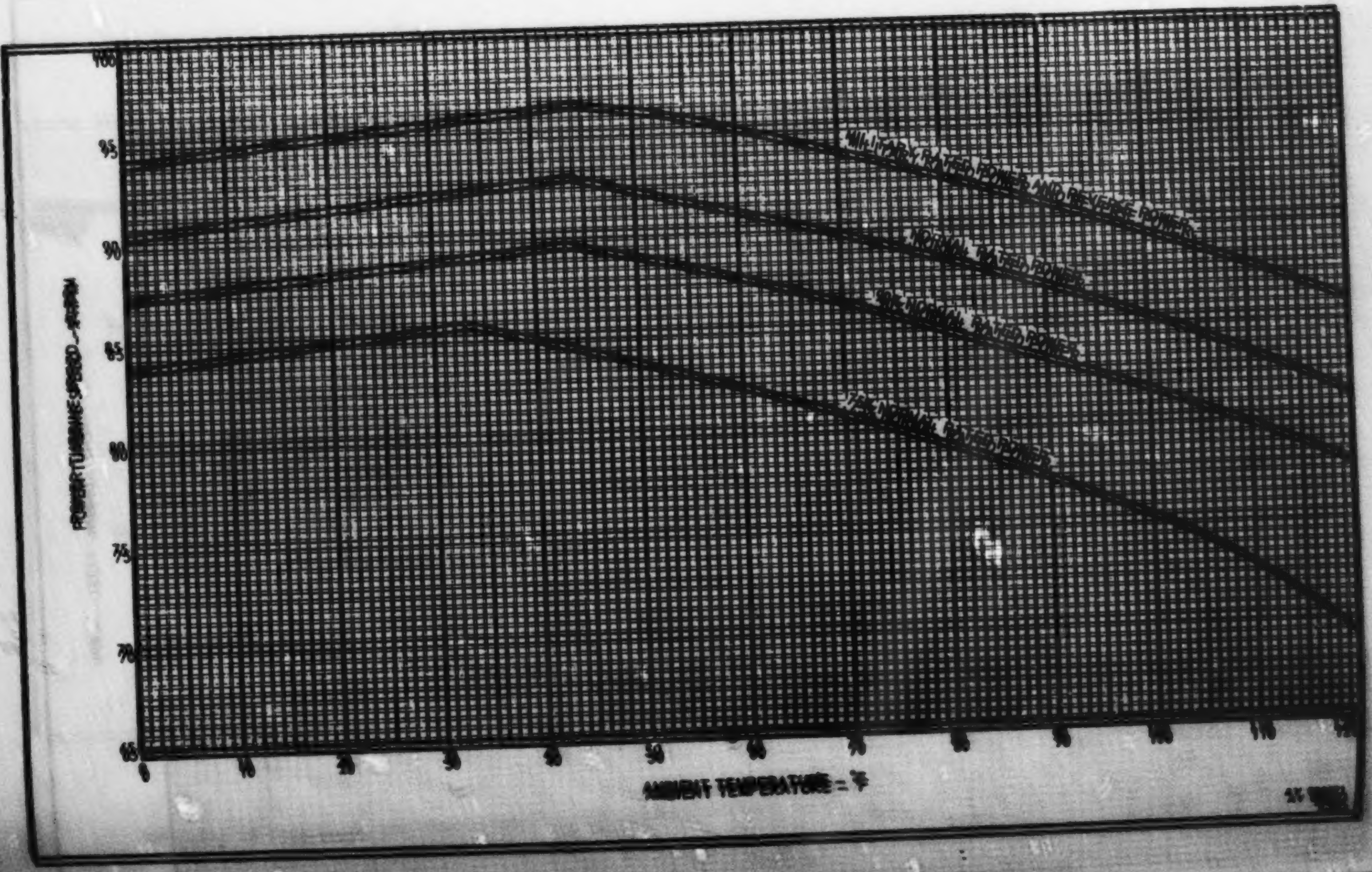


Figure 10-9. Optimum Power Turbine Speed Versus Ambient Temperature (T53-L-15)


MILITARY RATED POWER AND REVERSE POWER
NORMAL RATED POWER
90% NORMAL RATED POWER
75% NORMAL RATED POWER
POWER TURBINE SPEED ~ %RPM
100
95
90
85
80
75
70
65
0
10
20
30
40
50
60
70
80
90
100
110
120
AMBIENT TEMPERATURE ~ °F

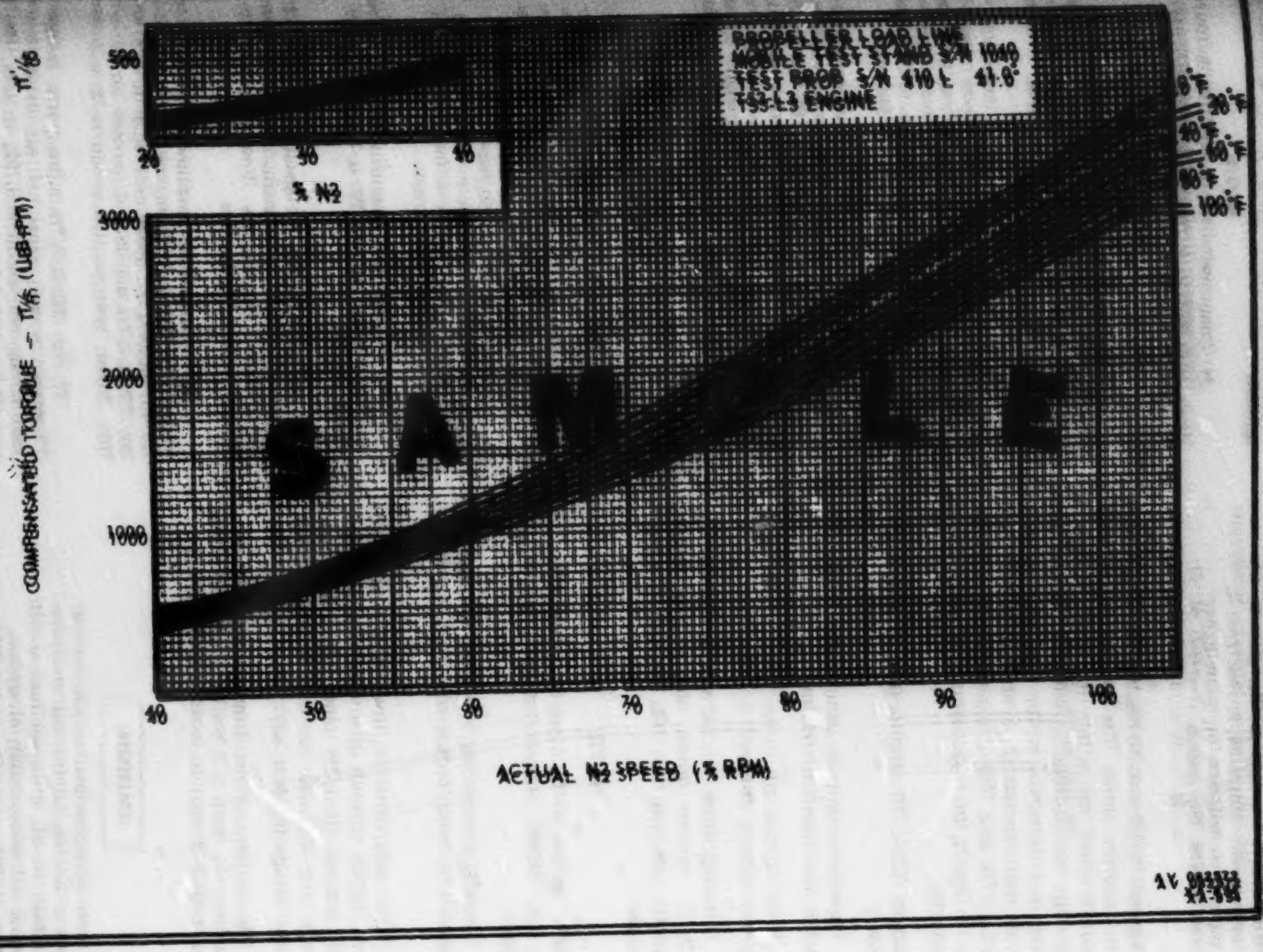


Figure 10-11. Propeller Calibration Chart (Sample) (T53-L-7/7A) (Using Test Propeller)

NOTE

For T53-L-701 engines, the electric torquemeter indication is read from a gage which indicates the value in percent of 4785 foot-pounds.

f. Figures 10-12 and 10-13 provide torquemeter system accuracy limits. The average line of plotted points shall fall within the limits shown. A torquemeter not correlating within limits requires checking and corrective action. The first step is to check all instrumentation. If no discrepancy exists, T53-L-7/7A and T53-L-15 engines must be returned to Depot for replacement of torquemeter components.

g. Adjust T53-L-701 engine torquemeter system as follows:

(1) Operate engine at ground idle, flight idle, 75% power and maximum power.

(2) Plot torque on curve (Figure 10-12) at each power setting obtained in Step (1).

(3) If torque does not fall within limits of figure 10-12, remove cover and adjust engine torquemeter junction box BAL and SENS screws as required.

NOTE

"BAL" Screw shifts slope of curve right or left. "SENS" Screw changes angle of slope.

(4) Repeat preceding steps (1) through (3) as necessary to bring torque within band of figure 10-12.

(5) After adjustments have been made, pot BAL and SENS screws of torquemeter junction box with enamel (item 33, table 2-2), then install box cover and lockwire cover attaching screws. Install anti-tampering lead seal.

10-28. Lubrication and Fuel Requirements. Jet engine fuel (item 47, table 2-2) and lubricating oil (item 63 or 64, table 2-2) shall be used for engine tests.

CAUTION

In event of engine malfunction (such as gear or bearing failure) that could contaminate the oil, drain and flush mobile testing unit subassembly oil system. Clean oil filter cartridge, and refill test trailer oil supply with fresh oil before resuming engine test. For servicing, refer to TM 55-4920-317-15.

10-29. Operating Limits. Do not exceed following operating limits:

a. Shaft horsepower (shp) operating limits are as follows:

(1) Compensated shp is specified in figures 10-42, 10-43, and 10-44. Allowable tolerance is plus 25 or minus 0 shp.

NOTE

Actual shp required may be calculated by multiplying compensated shp, obtained in figures 10-42, 10-43, and 10-44, by compensating factor from table 10-8.

(2) For T53-L-7/7A engines during cold weather operation, if takeoff or reverse power cannot be set because more than 1100 shp is required, takeoff and reverse trims must be set by using the all-weather trim lever. (Refer to paragraph 10-35.) Limit engine operation to a maximum of 1100 shp.

(3) For T53-L-15/701 engines during cold weather operation, if military or reverse power tri[illegible] cannot be set because more than 1165 shp for T53-L-15, or 1510 for T53-L-701 is required, takeoff and re[illegible] verse trims must be set by using cold weather stops. (Refer to paragraph 10-35.) Limit engine operation to a maximum of 1160 shp for T53-L-15 or 1160 shp for T53-L-701 during acceptance test.

NOTE

On T53-L-7/7A engines using a test propeller application if ambient temperature is below 10°F maximum torque limitation may prevent engine operation at 1100 shp. Under this condition, it is permissible to operate up to 4000 pound-feet for not more than 5 minutes to set any specified power. For balance of the period, do not exceed maximum torque.

(4) In flight idle, maximum shaft horsepower shall not exceed 110 for T53-L-7/7A and 120 for T53-L-15/701.

(5) In flight idle, N1 speed must be 62 to 68 percent for T53-L-7/7A engines and 63 to 69 percent for T53-L-15/701 engines. Power lever position should be 38 to 42 degrees.

(6) In ground idle, maximum shp shall not exceed 35 for T53-L-7/7A engines and 40 for T53-L-15/701 engines; N1 speed must be 39 to 44 percent for T53-L-7/7A and 48 to 52 percent for T53-L-15/701. Power lever position should be 23 to 26 [illegible]

(7) For T53-L-7/7A in low power check (75 percent power), actual fuel rate divided by actual shaft horsepower should be 0.782, or less. ([illegible] ures 10-42 and 10-55.)

b. Operating limits and specifications for [illegible] system are as follows:

(1) Jet fuel (item 47, table 2-2) shall be used.

(2) Maximum permitted fuel flow is specified in figures 10-5, 10-6 or 10-7.

NOTE

Topping governor bleed will be provided at all times during engine operation except when resetting fuel rate.

(3) Fuel flow in flight idle position is 222 pph maximum for T53-L-7/7A engines and 220 pph maximum for T53-L-15/701 engines for standard day operation.

(4) Fuel flow in ground idle position is 140 pph maximum for T53-L-7/7A and 150 pph maximum for T53-L-15/701 for standard day operation.

(5) On T53-L-7/7A fuel flow in takeoff position, emergency schedule, is 650 to 700 pph.

(6) On T53-L-7/7A fuel flow in flight idle, emergency schedule, is 95 to 125 pph.

(7) Fuel inlet pressure shall be 5 psi minimum.

c. Torque limits are as follows:

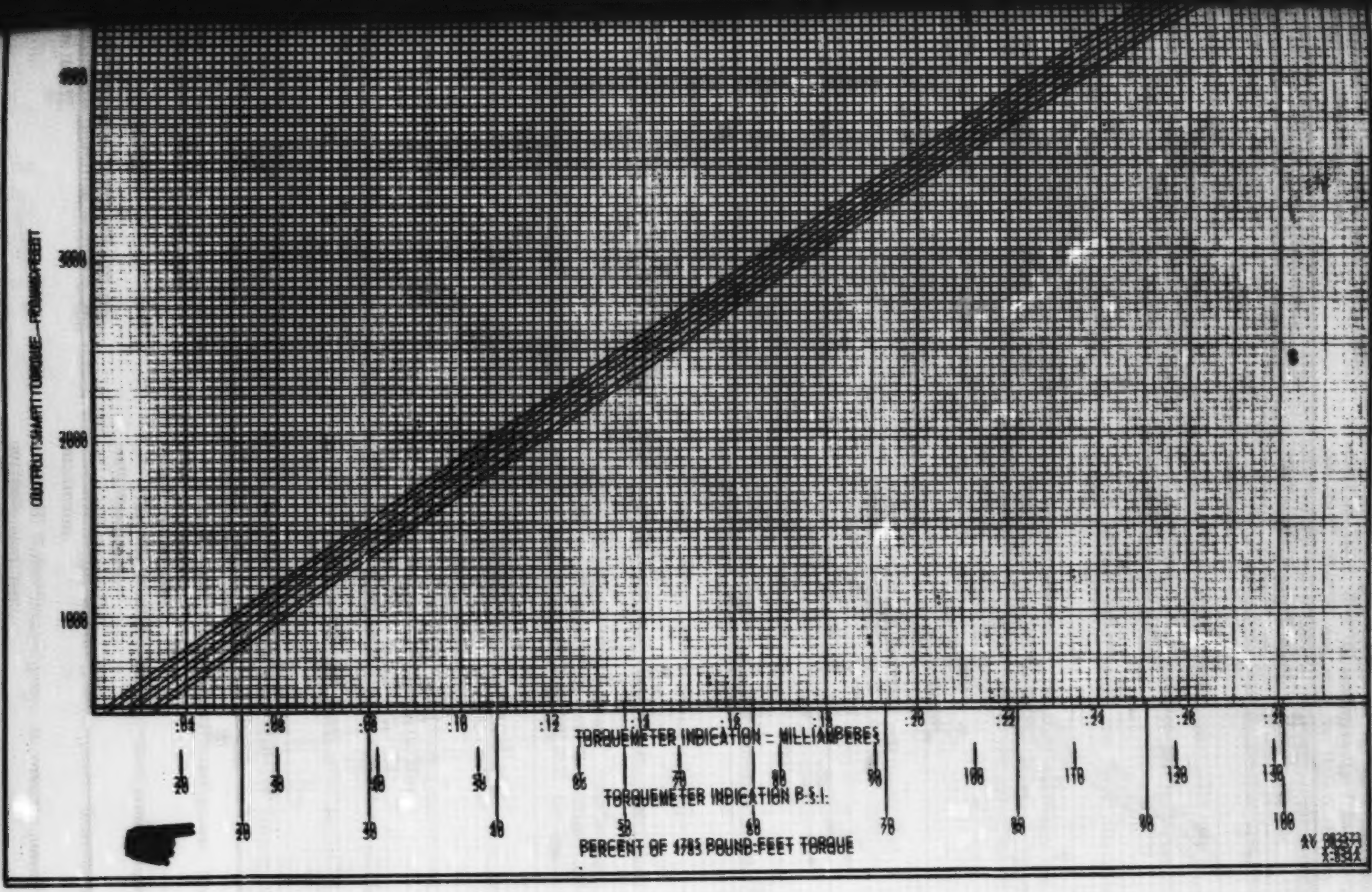
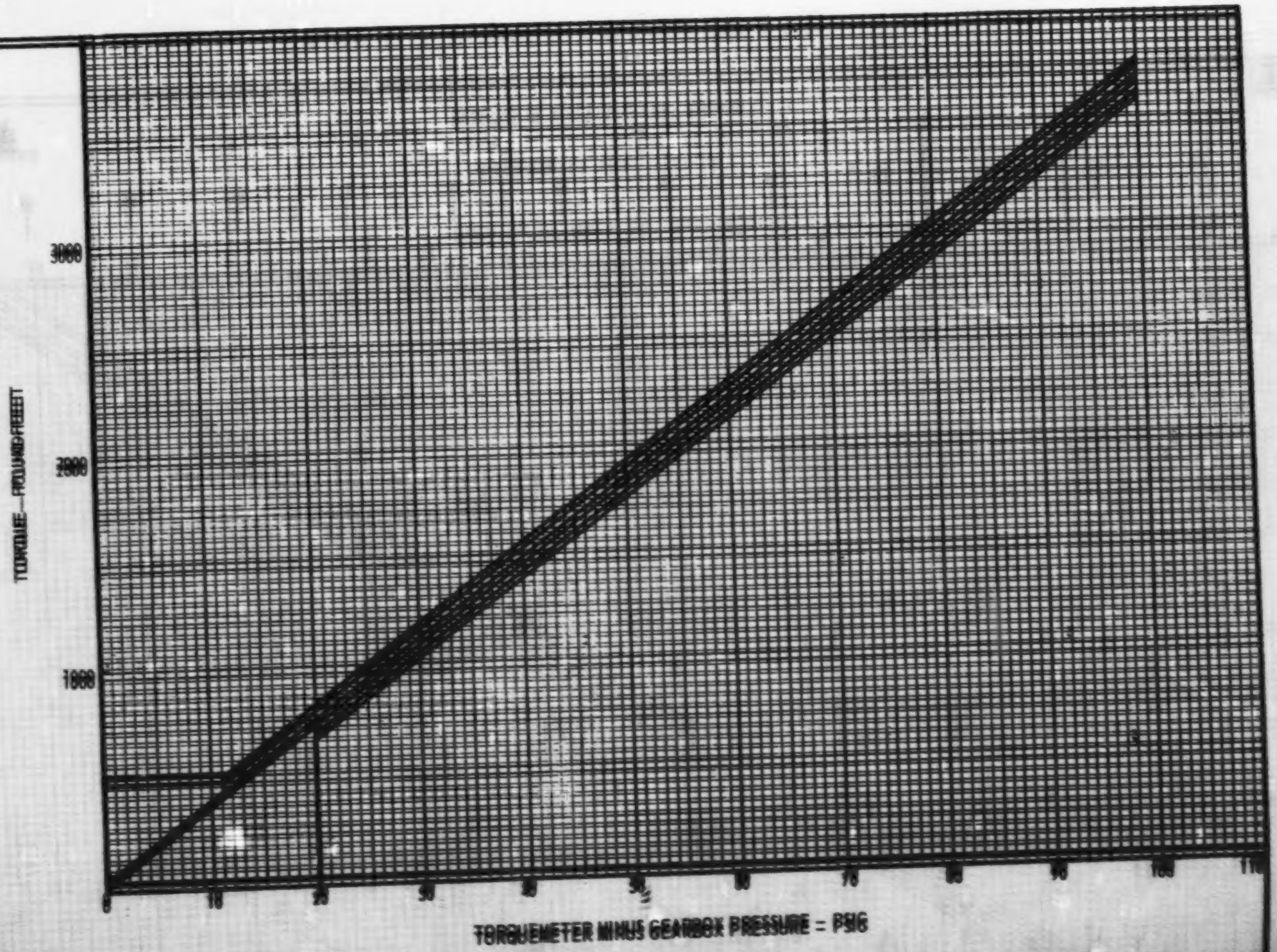


Figure 10-12. Torquemeter Conversion (T53-L-701)


TORQUE—POUND-FEET
3000
2000
1000
0
10
20
30
40
50
60
70
80
90
100
110
TORQUEMETER MINUS GEARBOX PRESSURE = PSIG

(1) For T53-L-7/7A/15, maximum continuous 0 pound-feet, and maximum torque for age is 3380 pound-feet.

(2) For T53-L-701, maximum continuous 0 pound-feet, and maximum torque for age is 4785 pound-feet.

imum speeds are as follows:

(1) Percent N1 values are specified in figure for T53-L-7/7A, figure 10-15 for T53-L-15, re 10-16 for T53-L-701 engines.

(2) Maximum N2 speed is 103 percent (T53- A) or 104 percent (T53-L-15/701).

(3) Maximum steady state percent N2 is given s 10-8, 10-9 or 10-10.

Operating limits and specifications for the oil are as follows:

(1) Lubricating oil (item 63 or 64, table 2-2) used.

(2) pressure shall be zero to 5 psig at power (T53-L-7/7A) or military rated power 15/701).

(3) Filter outlet pressure shall be 10 psi mini- applicable and 65 to 80 psi at normal rated above (T53-L-7/7A) or 80 to 100 psi at rated power and above (T53-L-15/701).

(4) Power-driven rotary (booster) pump pres- be 140 psi minimum at normal rated power ve.

(5) Gearbox pressure shall be 7 psi maximum 7/7A) and 4.5 psi maximum (T53-L-15/701).

(6) Inlet temperature shall be 180 to 210°F ([illegible] C) maximum.

(7) Outlet temperature shall be 300°F (149°C) m.

(8) Oil consumption should be one pint per hour during 20-minute normal rated power run.

(9) Oil flow should be 270 to 360 pph at takeoff power for T53-L-7/7A, 270 to 340 pph at rated power for T53-L-15, or 270 to 320 pph military rated power for T53-L-701.

(10) Power turbine bearing scavenge oil tem- shall be 204°C (399°F) maximum.

NOTE

No. 2 bearing seals 1-200-173-02 and 00-174-02 are installed on T53-L-15, figure 10-17.

(11) No. 2 bearing scavenge oil temperature shall be 204°C (399°F) maximum for T53-L-7/7A and 201°C (394°F) maximum for T53-L-15. For T53-L-701 No. 2 bearing scavenge oil temperature limit shall be as specified in figure 10-17.

f. Water brake rear bearing temperature 120°F maximum.

g. Water brake outlet temperature 190°F maximum.

h. During operation, exhaust gas temperature limits are as follows:

(1) Steady state (see figure 10-18, 10-19 or 10-20).

(2) Starting 760°C (1400°F) maximum, but it shall not exceed 650°C (1202°F) (T53-L-7/7A) or 675°C (1247°F) (T53-L-15/701) for more than 5 seconds total elapsed time.

CAUTION

When exhaust gas temperature exceeds 650°C (1202°F) (T53-L-7/7A) or 675°C (1247°F) (T53-L-15/701) for more than 5 seconds total elapsed time or 760°C (1400°F) at any time, an internal (hot-end) inspection shall be required.

i. The maximum allowable vibration limits are given in figure 10-21.

j. Seal leakage limits are as follows:

(1) Starter seal: 2 cc per hour maximum.

(2) Fuel control drive seal: Fuel leakage, 12 cc per hour maximum; fuel and oil leakage, 12 cc per hour maximum; oil leakage, 2 cc per hour maximum.

(3) Topping governor drive seal: same as for fuel control.

(4) Variable inlet guide vane actuator seal: 6 cc per hour maximum (T53-L-15/701).

(5) Output shaft seal: 2 cc per hour maximum.

(6) Tachometer-generator drive seals: 2 cc per hour maximum.

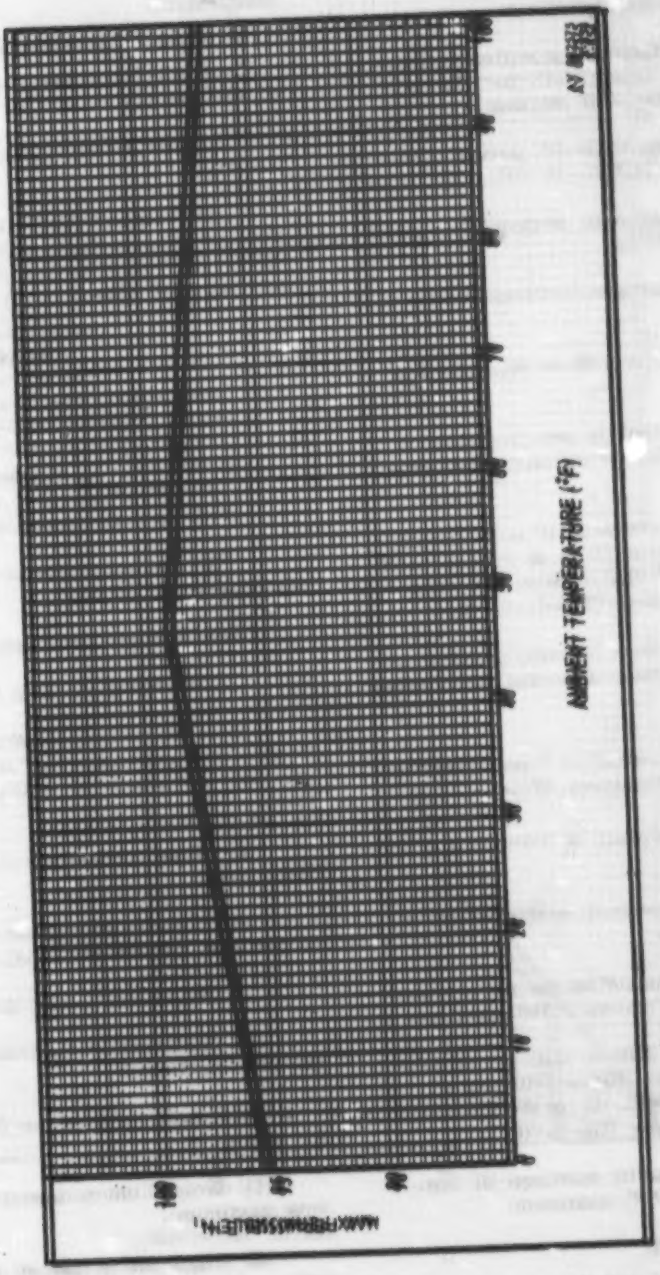
k. Acceleration limits for T53-L-7/7A engines are as follows:

(1) Ground idle to takeoff rated power: 8 seconds maximum.

(2) Flight idle to takeoff rated power: 4 seconds maximum.

(3) Flight idle to reverse power: 5 seconds maximum.

(4) Takeoff rated power to reverse power: 7 seconds maximum.


AMBIENT TEMPERATURE (°F)
MAX PERMISSIBLE HP

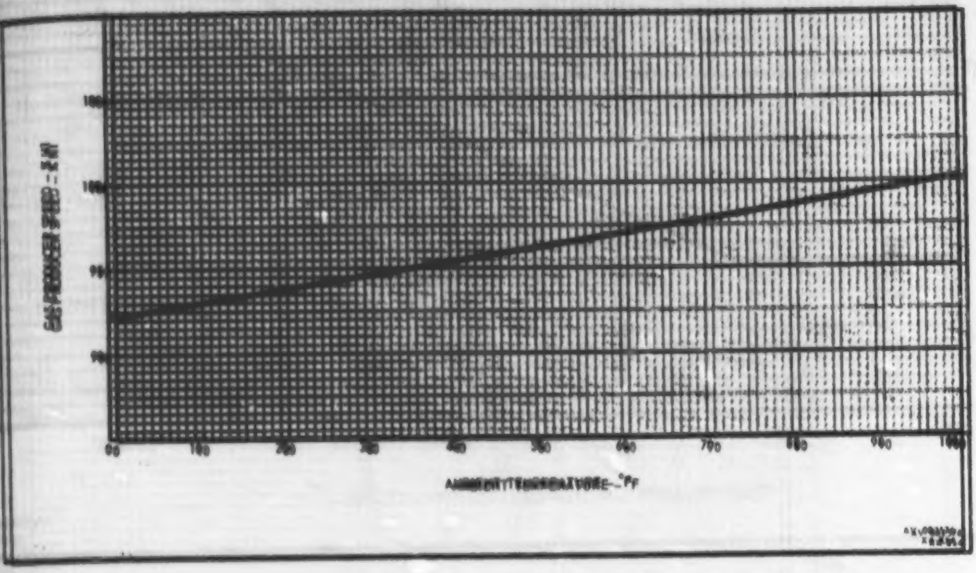


Figure 10-155. Maximum Permissible N1 Versus Ambient Temperature at Military Power (T53-L-13B)

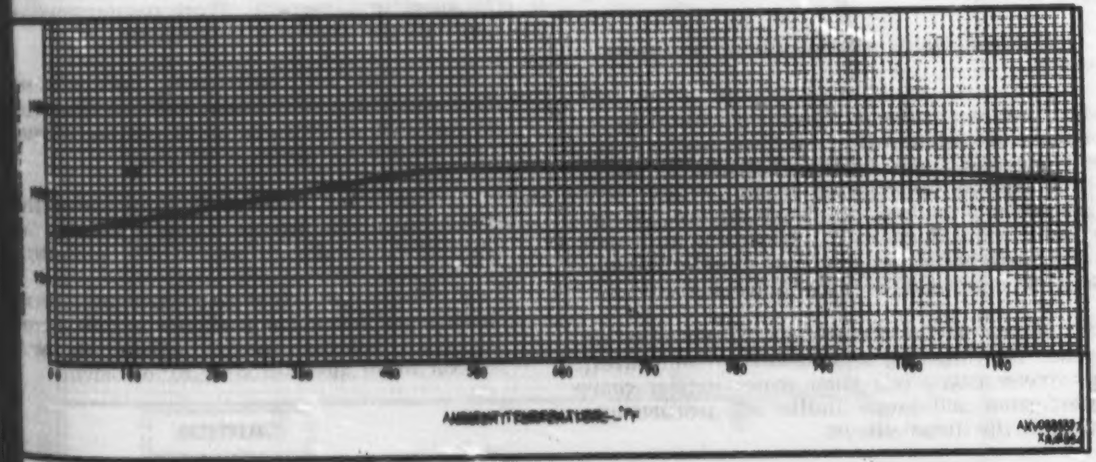


Figure 10-156. Maximum Permissible N1 Versus Ambient Temperature at Military Power (T53-L-703)

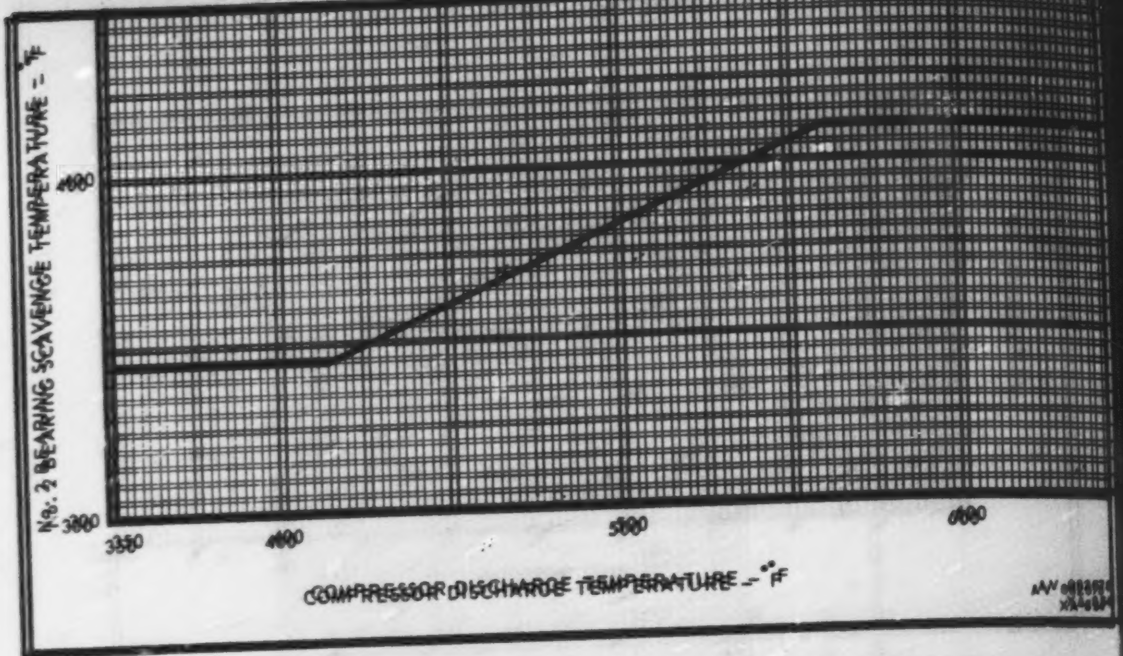


Figure 10-17. Maximum No. 2 Bearing Scavenge Temperature (T53-L-701)

l. Acceleration limits for T53-L-15/701 engines are as follows:

(1) Ground idle to military rated power: 8 seconds maximum for T53-L-15 or 9 seconds maximum for T53-L-701.

(2) Flight idle to military rated power: 4 seconds maximum for T53-L-15 or 5 seconds maximum for T53-L-701.

(3) Flight idle to reverse power: 5 seconds maximum.

10-50. Test Requirements. Engine accessories which have undergone repair are functionally tested after completion of the repairs. Accessories which are to be used as direct replacements or those which are suspected of malfunction during engine performance tests can be functionally tested prior to installation or reinstallation on the engine. Table 10-9 list these accessories and the test requirements.

10-51. Effects of Fuel Control and Oil Pressure Adjustment. The following adjustments to fuel control, power-driven rotary (oil) pump, power-driven rotary (booster) pump, and torque limiter will produce approximately the listed effects.

a. On T53-L-7/7A engines, one turn of takeoff trim will change fuel rate by 100 pph and N1 speed by 4 percent. Turn counterclockwise to increase and clockwise to decrease.

b. On T53-L-15/701 engines, one turn of military trim will change fuel rate by 200 pph and change power lever position 18 degrees. Turn counterc wise to increase and clockwise to decrease.

c. One turn of idle trim will change idle fuel by 50 pph. Turn counterclockwise to increase a clockwise to decrease.

d. On T53-L-7/7A engines, one turn of revers mechanical stop will change fuel rate by 300 ph N1 speed by 12 percent. Turn counterclockwise increase and clockwise to decrease.

e. On T53-L-15/701 engines, one turn of reve mechanical stop will change fuel rate by 400 ph N1 speed by 16 percent. Turn counterclockwise increase and clockwise to decrease.

f. One turn will change the torquemeter pres at the torque limiter cut-in point by 5 psig. Tu clockwise for higher pressure (T53-L-15 only).

g. Five turns of inlet guide vane feedback ro change speed at which vanes are completely open 2 percent. Lengthen rod for higher speed, shorten rod for lower speed (T53-L-15/701 only).

CAUTION

Do not change any other fuel control adju

h. One turn of rotary (oil) pump pressure reg ting valve will change oil filter discharge pressu 8 psi. Turn clockwise to increase pressure.

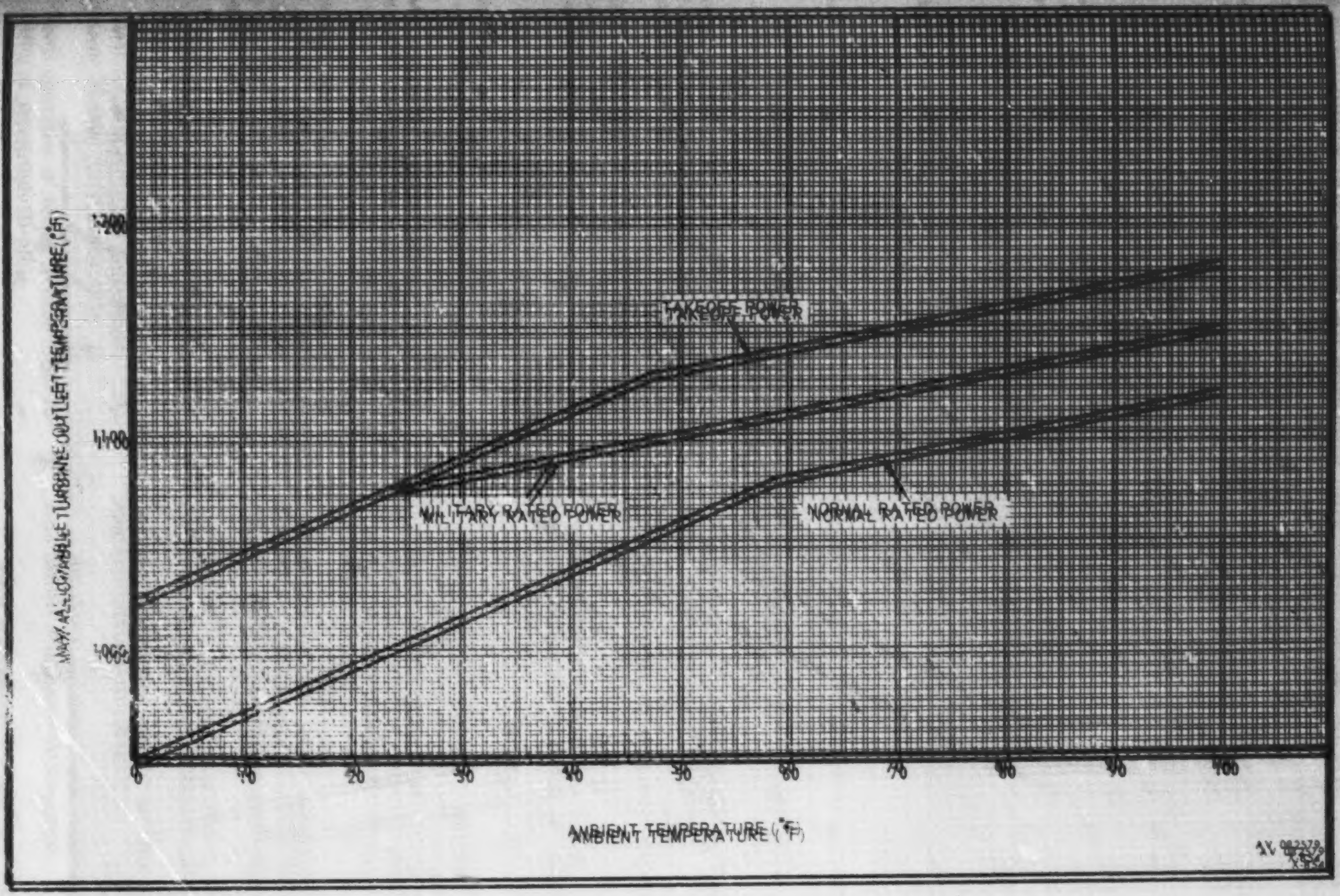
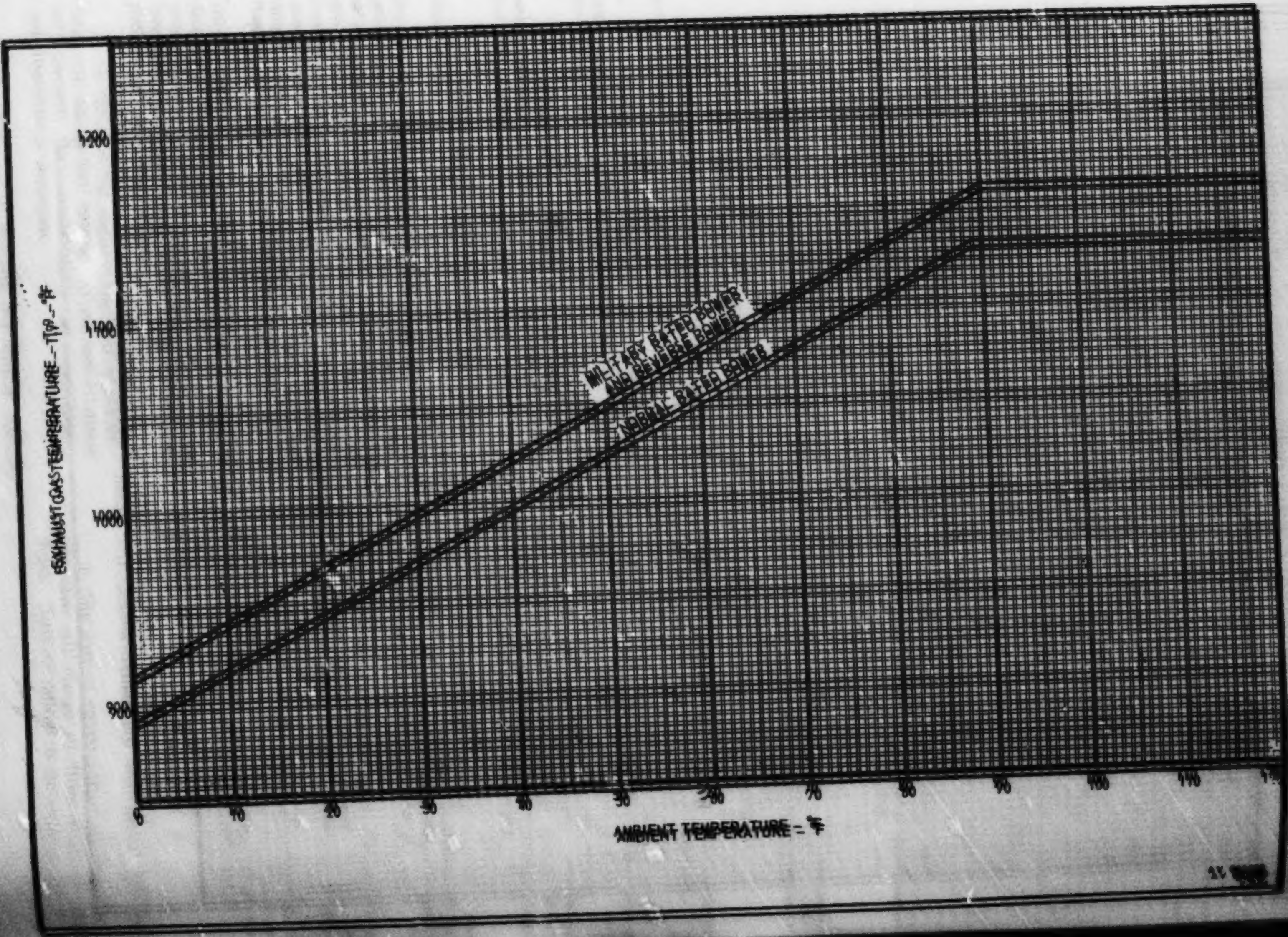


Figure 10-16. Maximum Allowable Exhaust Gas Temperature Versus Ambient Temperature (T53-L-7/7A)


MILITARY RATED POWER
AND REVERSE POWER
NORMAL RATED POWER
EXHAUST GAS TEMPERATURE — Tt9 — °F
900
1000
1100
1200
AMBIENT TEMPERATURE — °F
0
10
20
30
40
50
60
70
80
90
100
110
120

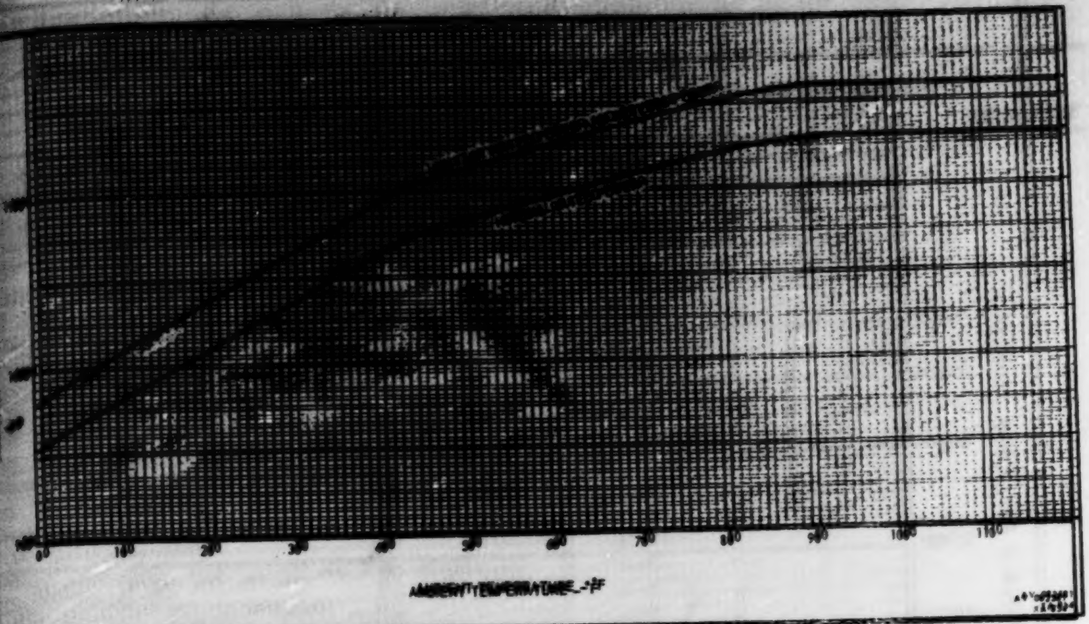


Figure 10-30. Maximum Allowable Exhaust Gas Temperature Versus Ambient Temperature (T53-L-701)

...tion of rotary (booster) pump relief valve ...will change pump pressure by 10 psi. Turn ...to increase pressure (T53-L-11/13/15 only).

...Fuel Control Operating Requirements. The ...requirements must be fulfilled by all fuel ...before engine acceptance.

NOTE

...following step a., the operating time may ...accumulated on more than one engine.

...fuel control or topping governor shall be ...engine unless it has accomplished a mini-...hours engine operation in the test trailer.

...during acceptance testing, it becomes nec-...to replace a fuel control and/or topping gover-...following checks must be made on the new ...governor immediately before continuing ...ptance test.

(1) Check all power ratings and bleed band ... (Refer to paragraph 10-36)

(2) Check operation of inlet guide vanes. (Re-...paragraph 10-36) (T53-L-13/701)

(3) Check operation of torque limiter (T53-L-...). (Refer to paragraph 10-36)

(4) Check operation of topping governor. (Re-...paragraph 10-36)

(5) Trim control as required. (Refer to para-...10-36)

(6) Check acceleration and wavecoffs or transients. (Refer to paragraph 10-36)

(7) Check fuel control emergency system (T53-L-11/13).

c. When requirements in preceding step b. have been met, acceptance test may be continued.

NOTE

If acceptance testing is completed before 2 hours of operating time has been accumulated on fuel control, engine operation must be continued until 2 hour minimum requirement is fulfilled.

d. If fuel regulator and/or topping governor have been replaced following completion of acceptance test run, preceding requirements apply to new component.

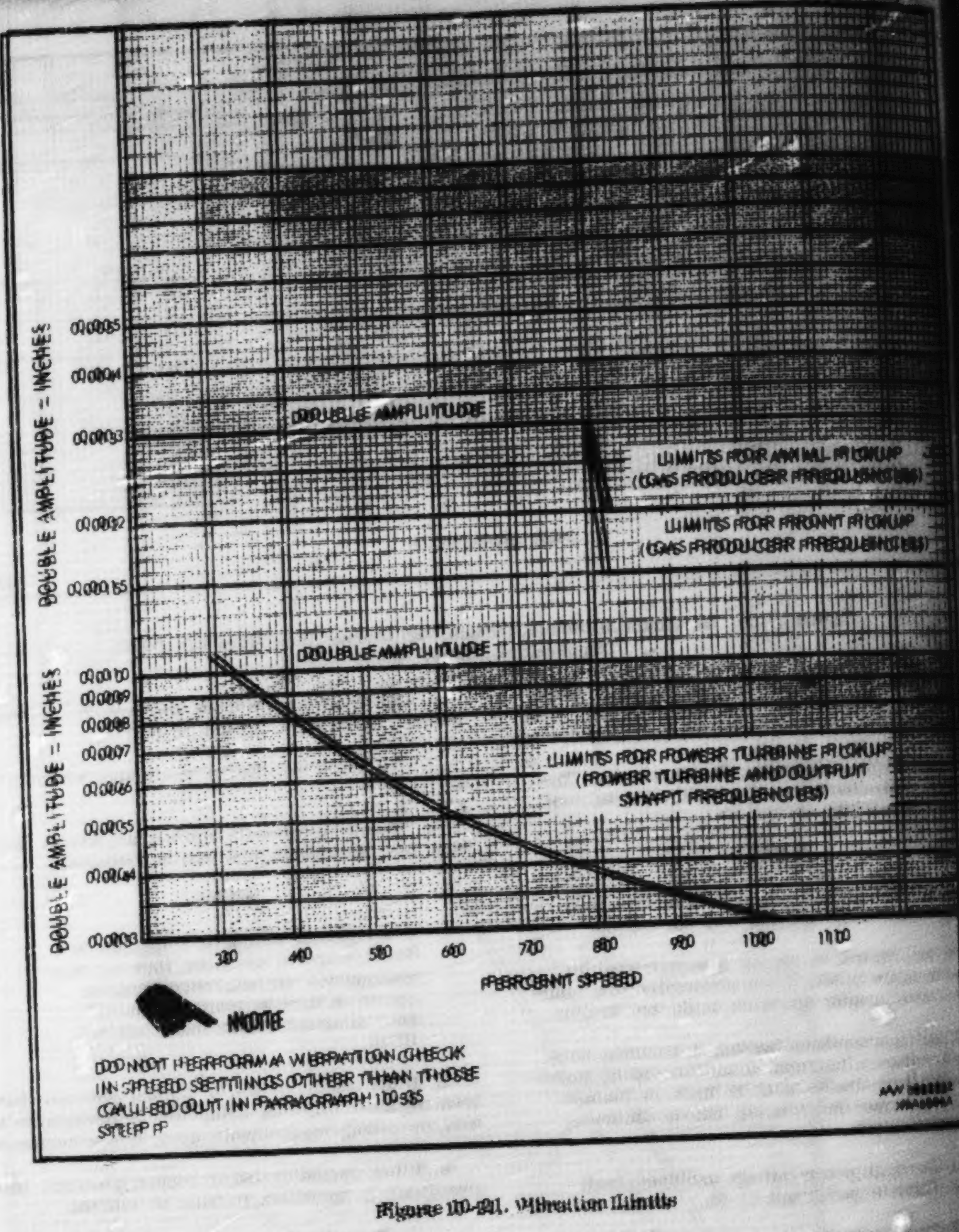
e. If fuel regulator and/or topping governor were previously in operation, proceed as follows:

(1) Operational checks outlined in preceding step b. must be performed.

(2) Total operating time must be 2 hours minimum before component is accepted.

f. When acceptance test and fuel control requirements have been met, engine and fuel control may be preserved and packed for shipment.

10-38. PRESTARTING CHECK PROCEDURE. Before starting engine proceed as follows:



NOTE

DO NOT PERFORM A VIBRATION CHECK IN SPEED SETTINGS OTHER THAN THOSE CALLED OUT IN PARAGRAPH 10-35 STEP P

Figure 10-21. Vibration Limits

Table 10-9. Test Requirements for Engine Accessories

PARTS REPLACED OR REPAIRED	FUNCTIONAL TEST REF. TO PARA	PERFORMANCE TEST	REMARKS
l, and Lubrication Hose Assemblies	8-116		
e Vane Actuator Assembly (T53-L-13/701)	8-118		
e Bleed Actuator Assembly (T53-L-7/7A)	8-120		
e Bleed Actuator Assembly (T53-L-13/701)	8-122		
Solenoid Valve	8-124		
perature-Sensing Bulb	8-125		
Plugs	8-126		
Unit	8-127		
Lead and Coil Assembly	8-128		
al Cable Assembly (T53-L-7/7A/13)	8-129		
al Cable Assembly (T53-L-701)	8-130		
Thermocouple Assembly (T53-L-7/7A)	8-131		
Thermocouple Assembly (T53-L-13/701)	8-131		
al Testing of Power-Driven Rotary (Booster) p (T53-L-7/7A/13)	8-132		
-Driven Rotary (Oil) Pump	8-133		
il Filter Assembly	8-135		
Filter Assembly, P/N [illegible] and P/N [illegible]	8-139		
ter Assembly	8-141		
Fuel Manifold Assembly (T53-L-7/7A)	8-142		
Fuel Manifold Assembly (T53-L-13/701)	8-143		
tion Chamber Drain Valve Assembly	8-145		
vider and Dump Valve Assembly (T53-L-13/701)	8-147		
Fuel Nozzles (T53-L-7/7A)	8-149		
Fuel Nozzles (T53-L-13/701)	8-150		
Fuel Manifold (T53-L-7/7A)	8-151		
Fuel Manifold (T53-L-13/701)	8-152		
Fuel Filter (T53-L-7/7A)	8-153		
Fuel Solenoid Valve Assembly	8-154		
ilter Valve (T53-L-13/701)	8-155		

C switch to ON. Indicator lamp above ould glow.

gize STARTER switch, and hold until N1 dicator reads 15 percent. Deenergize switch.

CAUTION

Do not energize igniter switch.

ck oil pressure indicator in control cubicle.

ually check engine for indication of fuel or ks.

le engine is coasting down, listen for rubs, noises, or excessive vibration.

the propeller calibration chart (if T53-L-7/ ing tested with test propeller) and engine test ntrol panel table. (See figures 10-10 and)

STARTING ENGINE. Proceed as follows:

DC switch to ON. Indicator lamp above ould glow.

b. Set FUEL SOL switch to ON. Indicator lamp should glow.

c. Check with fire guard to determine operation of warning beacon.

d. Check FUEL IN gage for pressure indication.

e. Set FUEL CONT switch to AUTO.

f. Set HOT-AIR switch to OFF.

NOTE

There is no provision for automatic operation of deicing system.

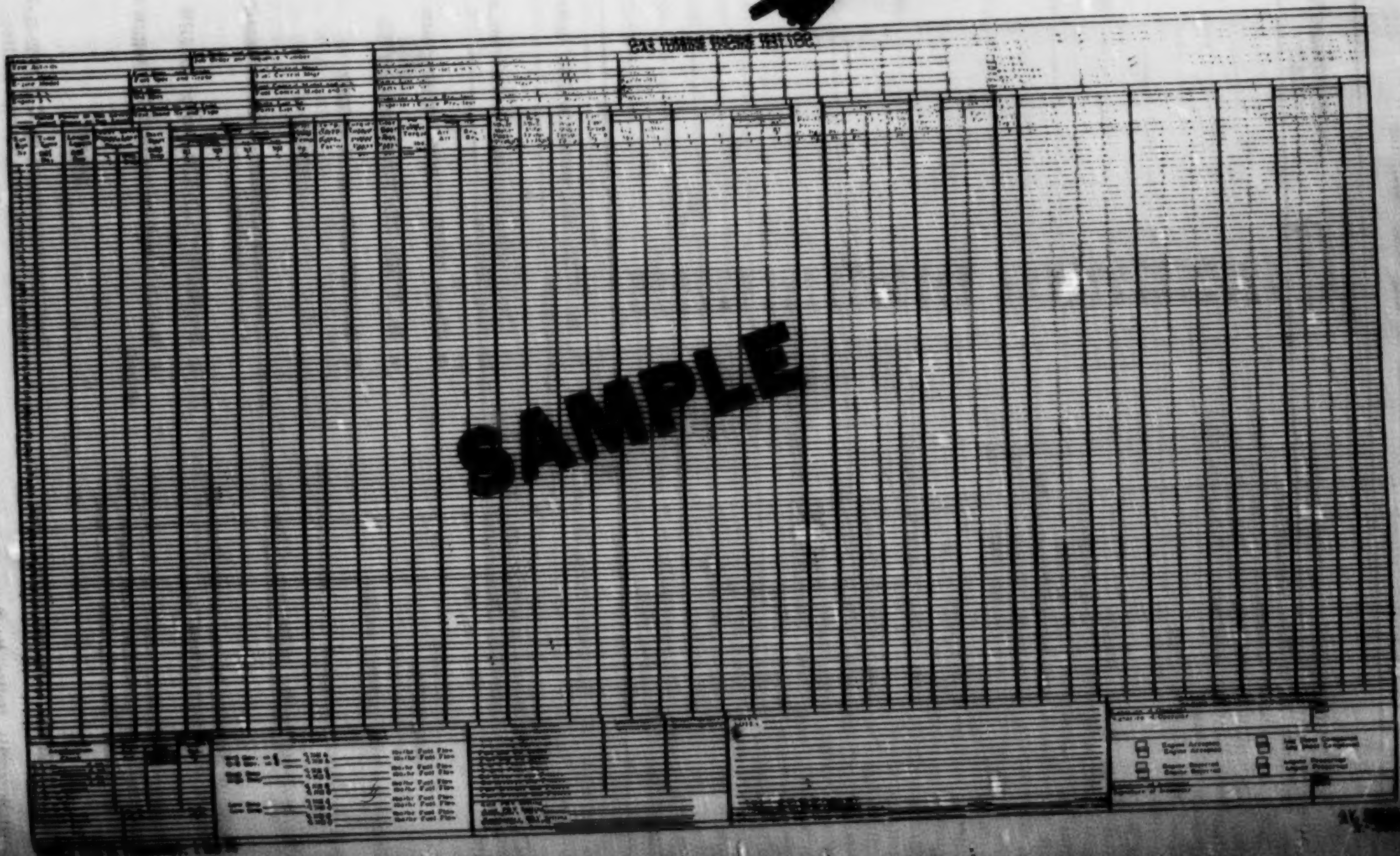
g. Set MANIFOLD SOL switch to OFF.

h. Set N2 bleed switch to OFF (toggle should be down).

NOTE

Omit the following step i. if T53-L-7/7A is being tested with test propeller.

i. At the water tower trailer check the following:



GAS TURBINE ENGINE TEST LOG

Job Order and Sequence Number

Fuel Control Mfgr

Fuel Control Model and S/N

Parts List No

SAMPLE

Signature of Operator

☐ Engine Accepted

☐ Engine Rejected

Signature of Inspector

ition fan, H$_2$O boost and tower pump
es to ON.

water in control lever partially open
rator.

t water back pressure lever to half open
perator.

l flowmeter "K" factor. (Refer to TM
7-15)

1, N2 FUEL selector switch to FUEL.

t THROTTLE N1 lever to ground idle posi-
degrees throttle position indication).

Condition N2 lever to open (away from oper-

CAUTION

t operate starter for more than 40
s. Allow 3 minutes cooling time
en starter engagements.

NOTE

llowing steps m. and o. apply to
L-7/7A engines.

gize START switch and ignition switch
ly.

gize IGNITION switch at 25 percent N1
°F (380°C) exhaust gas temperature,
occurs first. Deenergize START switch at
N1 speed.

NOTE

llowing steps p. and q. apply to
L-15/701 engines.

gize START switch and ignition switch
ly.

gize starter and ignition at 40 percent N1
exhaust gas temperature reaches 1250°F
e drop ignition switch only.

CAUTION

exhaust gas temperature exceeds
C (1202°F) (T53-L-7/7A) or 675°C
°F) for more than 5 seconds total
l time or 760°C (1400°F) at any
n internal (hot-end) inspection
be required.

celeration time to ground idle.

rbine outlet temperature. Maximum
perature at engine start is 1400°F
efer to preceding caution.

10-35. Engine Test Procedure. Proceed as follows:

NOTE

The following steps a., c.(2), c.(9), c.(10), c.(11), and d. do not apply to T53-L-7/7A engines that are being tested with a test propeller. The steps will apply if the T53-L-7/7A is being tested with a water brake.

a. Adjust water in control lever to obtain 25 to 30 percent N2.

b. Maintain THROTTLE N1 lever at 23 to 26 degree position on throttle position indicator.

c. Perform ground idle check as follows:

(1) Check that N1 speed is 39 to 44 percent (T53-L-7/7A) or 48 to 52 percent (T53-L-15/701).

(2) Check that N2 speed is 25 to 30 percent.

(3) Adjust fuel control if necessary. (Refer to paragraph 10-31.)

(4) Check oil filter out pressure. Minimum pressure should be 10 psi.

(5) Check scavenge oil temperature. Indicator readings should be rising 300°F (149°C) maximum.

(6) Visually inspect engine for external leakage.

(7) Check all pressure and temperature indications.

(8) Check vibration meter for indication from all transducers.

(9) Check water-in and water-out temperature.

(10) Check water-in and water-out pressure.

(11) Check water brake bearing temperature (220°F maximum for rear bearing).

(12) Ensure that ANTI-ICING PRESSURE gage reads zero and DE-ICE AIR ON indicator lamp is on, indicating a closed inline valve.

(13) Check inlet oil temperature 210°F maximum.

(14) Record a short reading on engine test log to include: compressor rotor (N1) speed, power turbine (N2) speed, ambient temperature, fuel flow, shaft horsepower, torque, throttle position, turbine outlet temperature, fuel manifold pressure, torquemeter pressure, and gearbox pressure.

d. Adjust water brake back pressure.

(1) Simultaneously advance throttle N1 lever and open water-in control lever.

CAUTION

Do not exceed N2 speed as specified by figure 10-68, 10-69 or 10-70.

(2) Gradually increase N1 speed until stop is reached, unless limited sooner by maximum shaft horsepower, exhaust gas temperature, torque, N1 and N2 speeds, fuel, and vibration limits.

(3) At maximum condition, observe water brake out temperature. Temperature should not exceed 190°F.

NOTE

In following step (4), closing the back pressure lever reduces N2 speed and increases load.

(4) If temperature is low (less than 160°F) decelerate to ground idle and close water brake back pressure lever slightly.

(5) Accelerate to maximum power conditions and recheck water-out temperature.

(6) If temperature is high (over 190°F), decelerate to ground idle and open water brake pressure slightly.

NOTE

Opening the back pressure lever increases N2 speed and decreases load.

(7) Repeat preceding steps (1) through (6) until water temperature is stabilized between 160°F and 180°F.

(8) Lock water brake pressure lever in position.

e. Advance THROTTLE N1 lever until 38 to 42 degrees (flat spot on fuel control cam) is reached on throttle position indicator.

f. Perform flight idle check as follows:

(1) Check that N1 speed is 62 to 68 percent (T53-L-7/7A) or 63 to 68 percent (T53-L-15/701).

(2) Shaft horsepower shall not exceed 110 (T53-L-7/7A) or 130 (T53-L-15/701) for flight idle.

(3) Use propeller calibration chart or electronic torque indicator, N2 percent speed count, and formula given in paragraph 10-227.

(4) Adjust fuel control idle fuel trim to highest possible fuel rate without exceeding speed, fuel, power, or gas temperature limits for ground idle and flight idle. (Refer to paragraph 10-229.)

NOTE

Fuel control trim locking screw sh tightened to 25 to 30 pound-inches t after adjustments.

(5) Recheck all instrumentation as step c.(4), and (6) through (13).

(6) Record a full reading on engine t

g. Perform inlet guide vane check. (T 701).

(1) Accelerate slowly to check inlet g operation. Observe position indicator in c compartment.

(2) Record gas producer speed, fuel ambient temperature at the following points:

(a) Where inlet guide vanes begin t

(b) Where vanes are fully open.

(c) Where vanes begin to close.

(d) Where vanes are fully closed. ± one percent of preceding step (a).

(e) Where vanes begin to open again. Should be ± one percent of preceding step (a).

(3) Should meet limits of figure 10-

(4) If guide vane operation is not wit adjust feedback rod at ends as required.

(a) Lengthen rod if a higher N1 spe quired. Shorten rod if a lower N1 speed is r

(b) Five turns will change N1 spee which vanes are fully opened by approxima percent.

(c) Secure rod ends and lockwire.

h. Slowly advance THROTTLE N1 lever u bleed band closes.

NOTE

Bleed band closure may be identified by using a suitable signal device.

i. Record a full reading on engine test log point of closure.

j. Bleed band must remain closed during state operations above close line in figure 10- 10-226, or 10-227.

k. Decelerate slowly and record N1, fuel flow, ambient temperature, and c pressure where bleed band just opens.

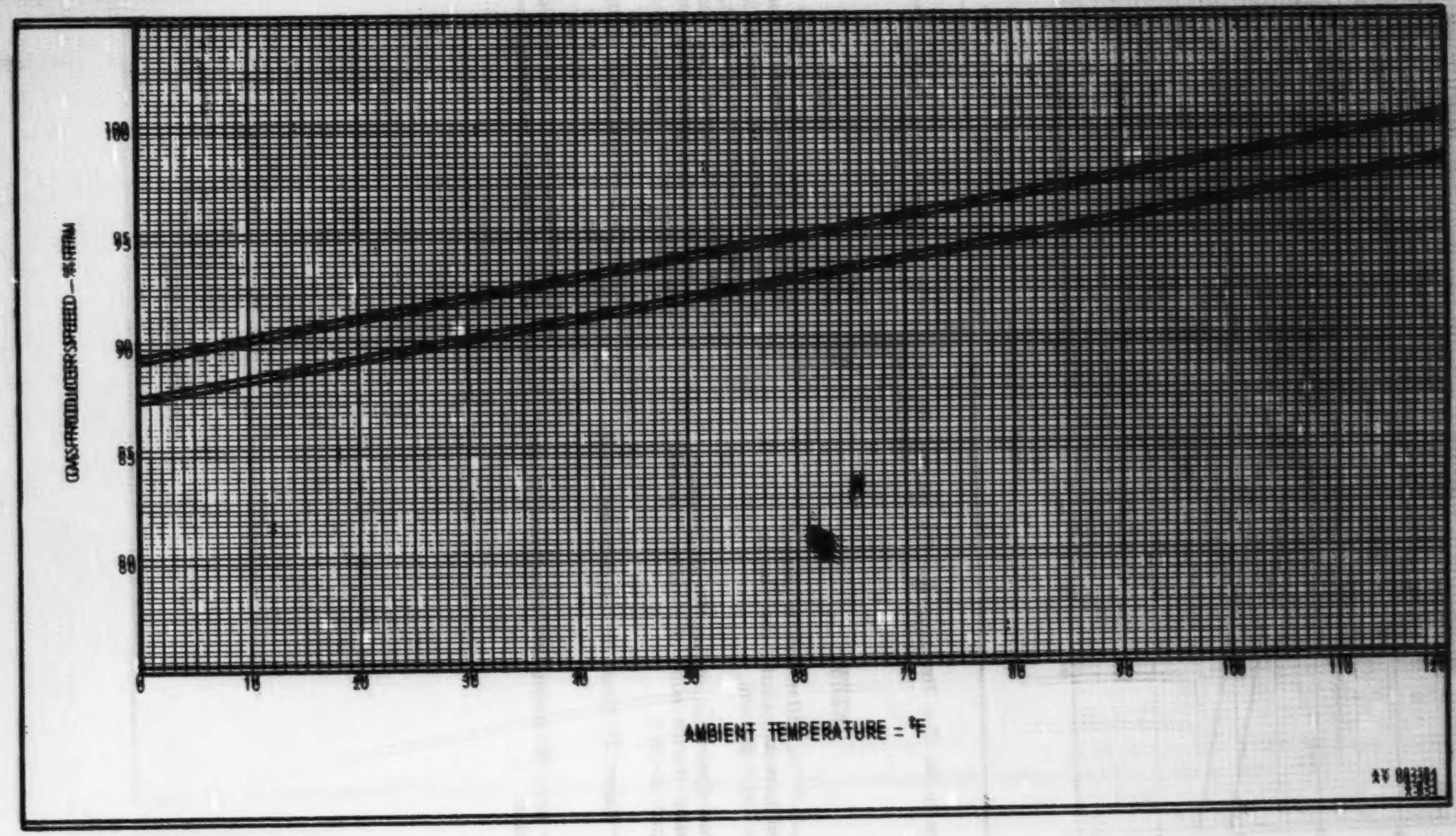


Figure 10-28: Gas Producer Speed at Which Inlet Guide Vane Is Open Versus Ambient Temperature (T53-L-15)

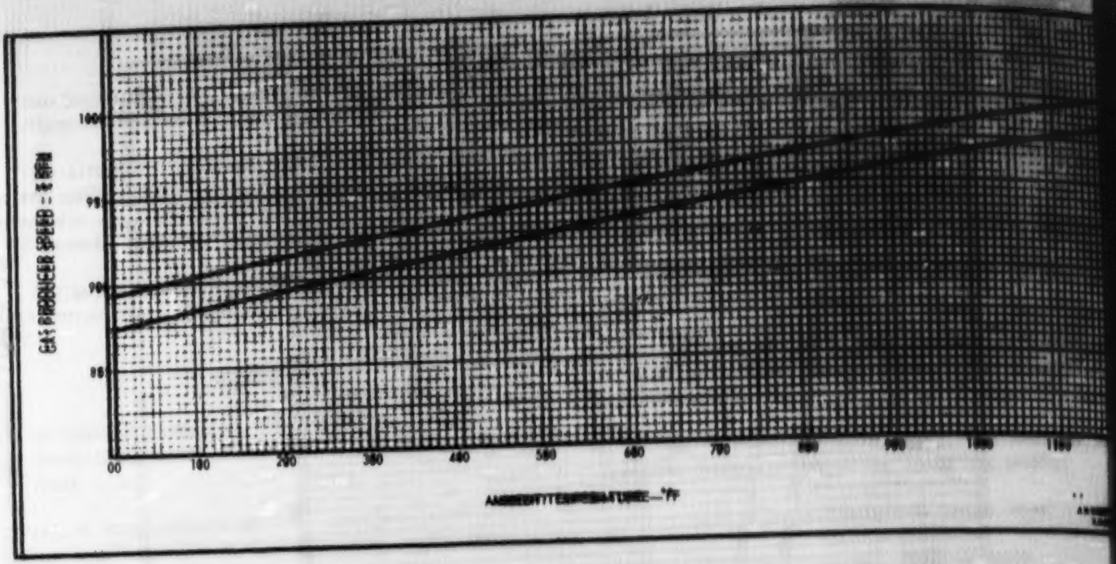


Figure 10-24. Gas Producer Speed at Which Inlet Guide Vane Is Open Versus Ambient Temperature
(T53-L-701)

NOTE

On T53-L-7/7A, difference in percent N1 speed between opening and closing shall be 2 to 3 percent.

l. If anti-icing system is not functioning properly, adjust bleed band closure point, if required, as follows: (See figure 10-23.)

(1) For higher N1 speed turn adjustment screw clockwise.

(2) For lower N1 speed turn adjustment screw counterclockwise.

NOTE

If adjustments are made to bleed band closure point at any time; recheck acceleration, bleed band operation, and
offs. Bleed band must also remain closed at normal rated power with anti-ice on and customer air open for one minute.

m. Repeat preceding steps h. through k. for T
L-15/701 only.

n. If anti-icing system is not functioning
refer to paragraphs 5-158 through 5-159.

o. (Deleted)

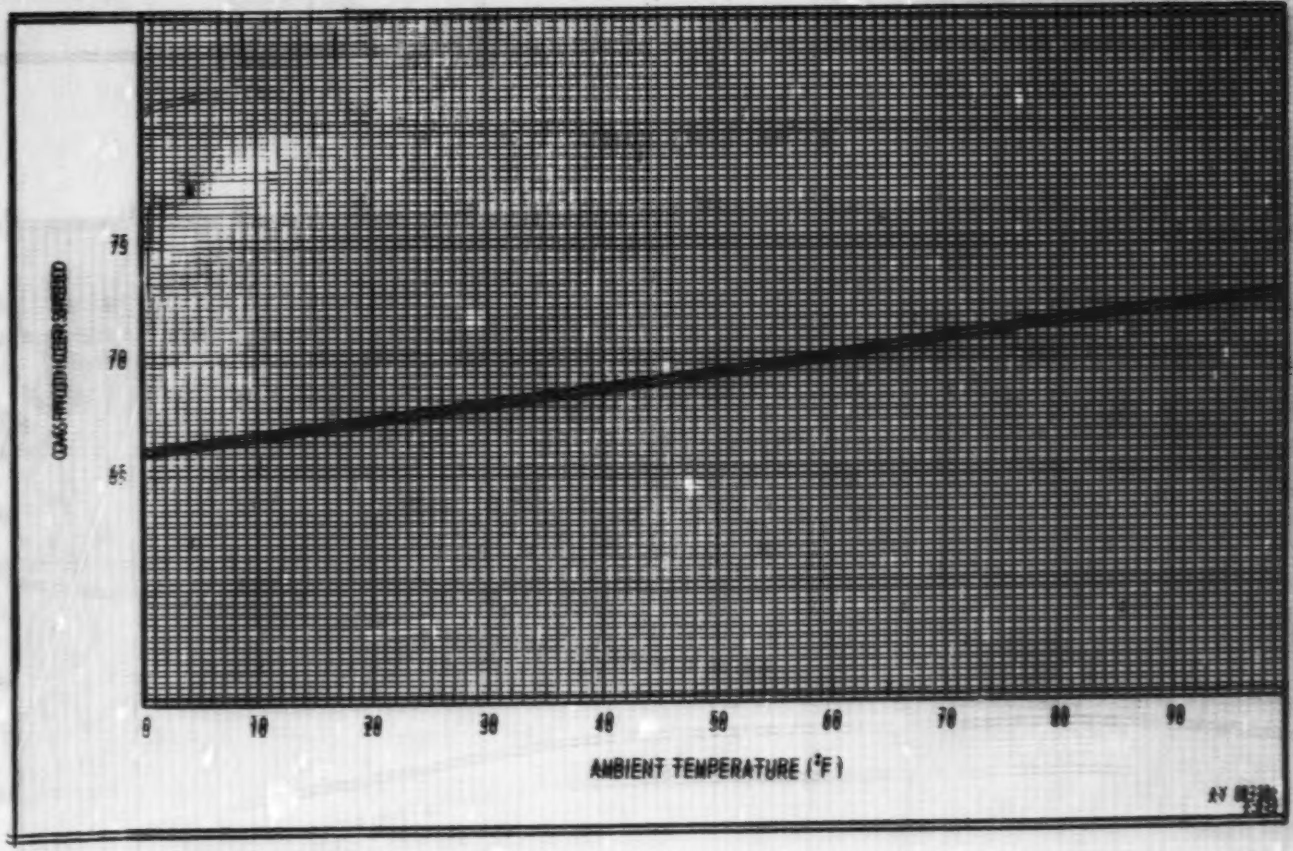


Figure 10-25: Bleed Band Closing Requirements (T53-L-7/7A)

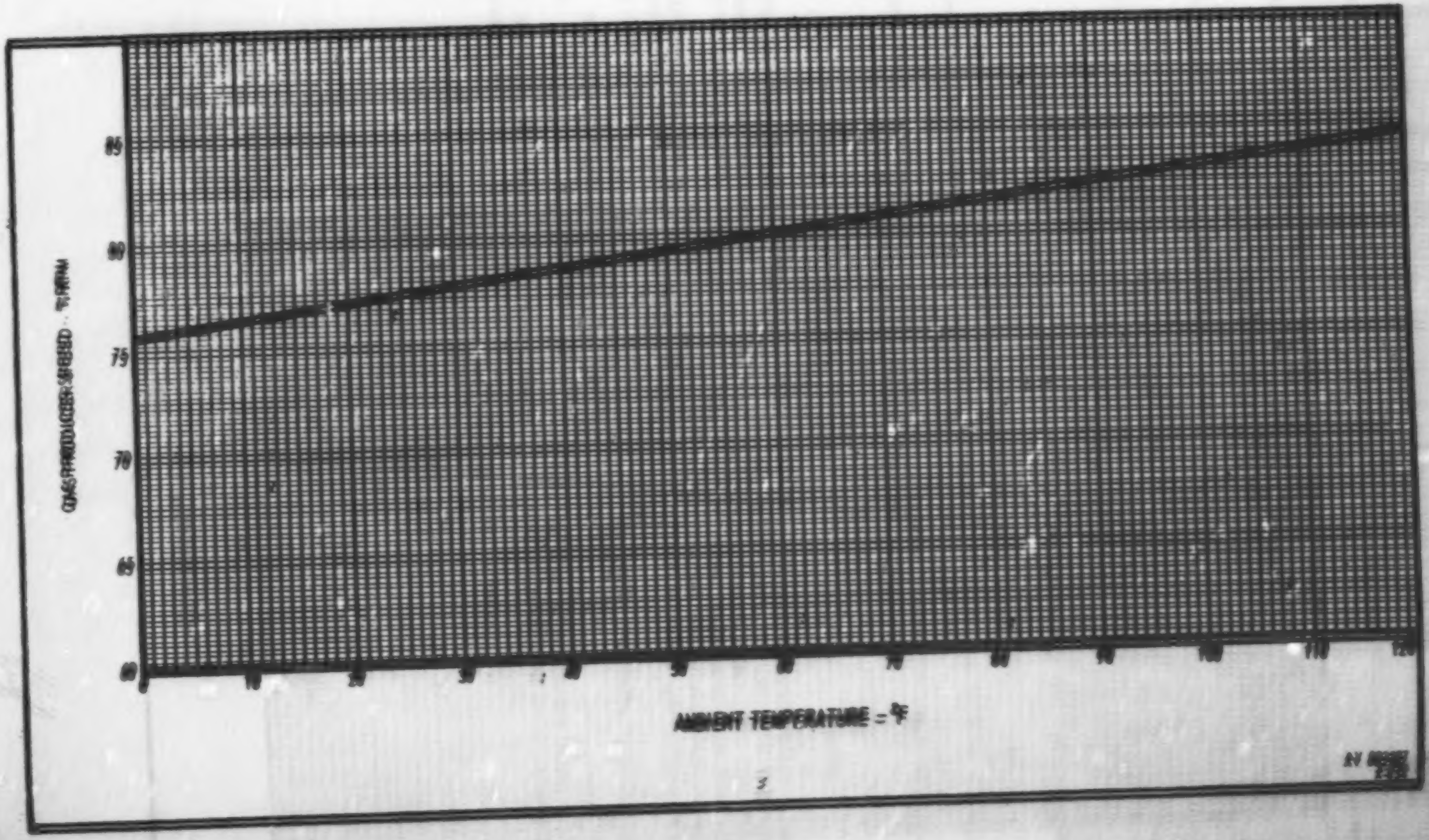


Figure 10-31. Bleed Band Closing Requirements (T53-L-13)

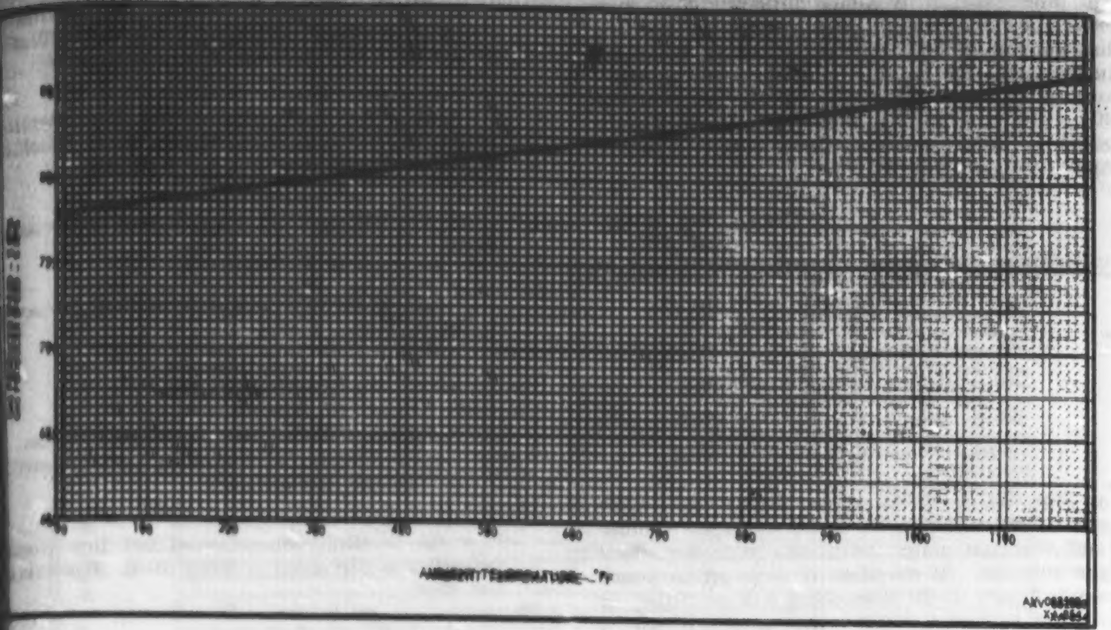


Figure 10-27. Bleed Band Closing Requirements (T53-L-701)

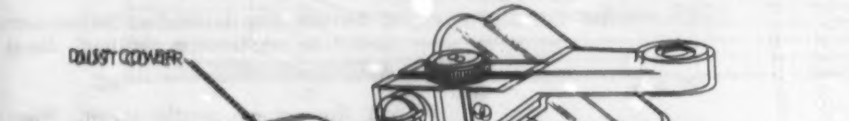

DUST COVER
0
15
30
45
60
LOCKNUT
ADJUSTMENT SCREW
LOCKSCREW
AKV083889
XAA8654

Figure 10-28. Bleed Band Adjustment

p. For T53-L-7/7A adjust THROTTLE N1 lever to each of the following speed settings, and record vibration meter indications in proper space on engine test log. All readings must be within limits shown in figure 10-21. For propeller operation use 200 cps filter or 140 cps filter for water brake operation. If limits are exceeded, refer to paragraphs 10-17 through 10-20.

Gas Producer (N1) Speed	Output Shaft Speed - % rpm (N2) (with water brake only)
80	79.5
85	88.3
90	94.2
95	97.7
max	98.2

q. For T53-L-13/703 adjust THROTTLE N1 lever to each of the following N1 speed settings. Record N2 and vibration meter indications in proper space on engine test log. All readings must be within limits shown in figure 10-21 when using 140 cps filter. If limits are exceeded, refer to paragraphs 10-17 through 10-20. Adjust water in control lever to obtain the indicated N2 speeds.

Gas Producer Speed - % rpm (N1)	Output Shaft Speed - % rpm (N2)
	±0.5 percent
80	75
85	88.3
90	94.2
95 or maximum obtainable without exceeding engine limitations	100

(1) When an engine is suspected of vibration problems, turn to the 200 cycle filter.

(2) If the level of displacement is now within limits, low frequency vibrations are causing the high readings.

(3) In the event that vibration levels do not diminish using the 200 cycle filter, the vibration is of either N1 or N2 rotor frequency.

(4) Observe limits of figure 10-21.

r. Check fuel flow rate versus manifold pressure as follows:

(1) For T53-L-7/7A check fuel flow rate ve manifold pressure, as shown in figure 10-20, at the points: 80 and 90 percent, and takeoff power.

(2) Enter curve at measured fuel rate, and project up to obtain manifold pressure. Manifold pressure should be within curve limits.

s. For T53-L-7/7A check takeoff power as follows:

(1) Determine compensated fuel flow as sho in figure 10-5.

CAUTION

Ensure that fuel flow curve used is compatible with total operating time and model of engine being tested.

(2) Multiply compensated fuel flow by compensating factor given in table 10-3. Result is ac fuel flow.

(3) Advance THROTTLE N1 level until act fuel flow is indicated on digital counter. If water brake is being used set N2 speed at 100 percent.

NOTE

If takeoff stop is reached before actual fuel flow required is obtained, check shaft horsepower.

(4) Record percent N2 speed. Then, using propeller calibration chart or torque indication fo water brake and formula given in paragraph 10-17, compute actual shaft horsepower.

CAUTION

Do not exceed 1100 shaft horsepower. However, 1185 horsepower is acceptable for trimming.

NOTE

If actual shaft horsepower is low, adjust takeoff trim counterclockwise. If actual shaft horsepower exceeds minimum required shaft horsepower by more than 25 shaft horsepower, adjust takeoff trim clockwise. If required shaft horsepower is in excess of 1185, follow procedure in following step t.

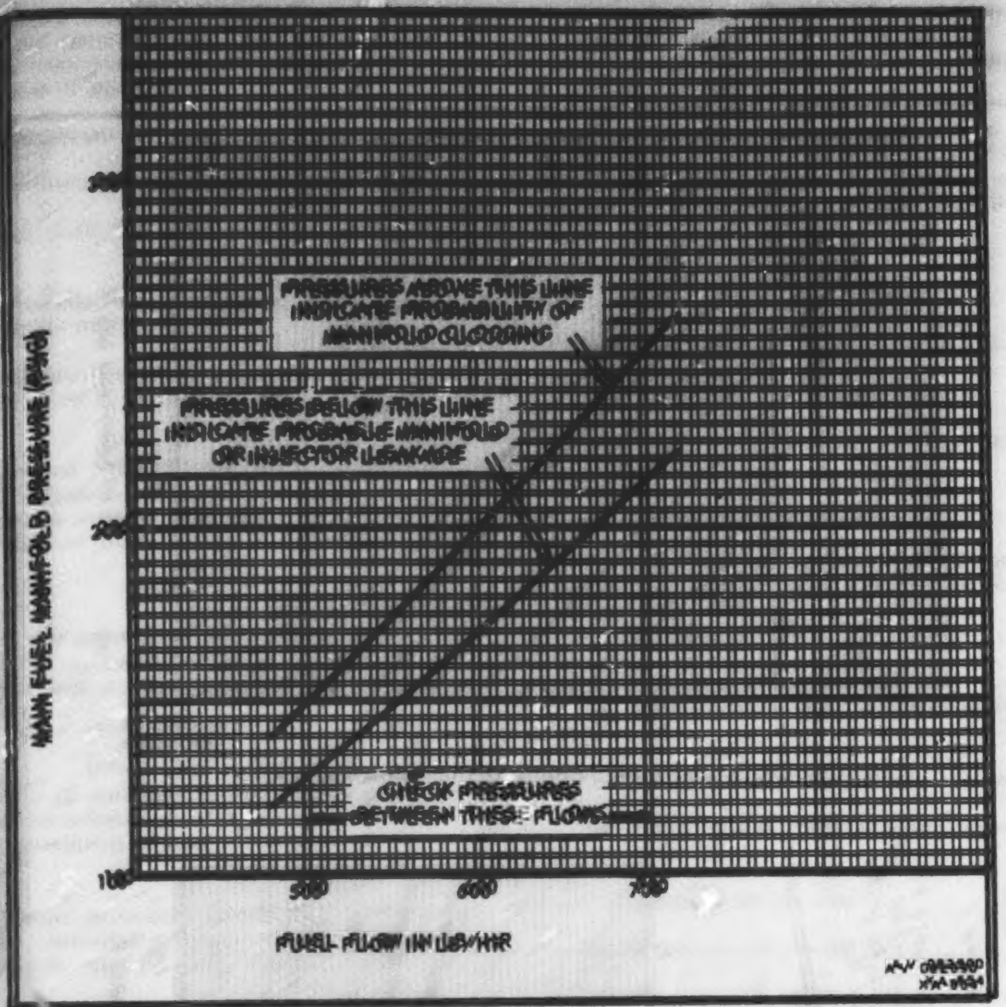


Figure 10-29. Fuel Flow Versus Main Fuel Manifold Pressure (T53-L-11/11A)

(5) Determine compensated shaft horsepower rom figure 10-8.

(6) Multiply compensated shaft horsepower by ecting factor given in table 10-6. Result is e shaft horsepower required. Adjust N1 e lever to actual power.

(7) Record percent N1 speed.

(8) Compare actual shaft horsepower, preceding) with minimum shaft horsepower required, g step (6).

r T53-L-11/11A engines, this procedure shall when takeoff and reverse trims cannot be set extreme low ambient temperatures require power in excess of 1100 shp.

(1) Retard THROTTLE N1 lever to ground idle.

(2) Using figure 10-30, select compensated sepower at extremes of band of curve at left existing ambient temperature.

(3) Multiply result of preceding step (2) by compensating factor given in table 10-6.

(4) Adjust throttle N1 lever until engine operates at shp between limits from preceding step (3). Record N1 speed.

(5) Using percent N1 speed recorded in preceding step (4), enter bottom of curve at right of figure 10-30; then project to ambient temperature line, and read all-weather trim N1 speed at left.

(6) Decelerate to ground idle.

(7) Rotate lever on fuel control counterclockwise to all-weather trim position.

(8) With THROTTLE N1 lever against stop, trim takeoff N1 speed to that speed obtained in preceding step (5).

(9) Record a full reading on engine test log.

IF REQUIRED TAKEOFF POWER EXCEEDS 1200 SHP:

1. SELECT COMPENSATED SHP TO FALL IN BAND BELOW AT EXISTING AMBIENT.
2. MULTIPLY BY δ AND SET THIS ACTUAL POWER.
3. RECORD GAS PRODUCER SPEED COUNT.
4. USING COUNT FROM 3, ENTER BOTTOM OF CURVE AT RIGHT. PROJECT TO THE AMBIENT TEMPERATURE LINE AND READ ALL WEATHER TRIM GAS PRODUCER SPEED AT LEFT.
5. ROTATE LEVER ON FUEL CONTROL TO ALL WEATHER TRIM POSITION AND ADJUST GAS PRODUCER TO SPEED FROM 4.

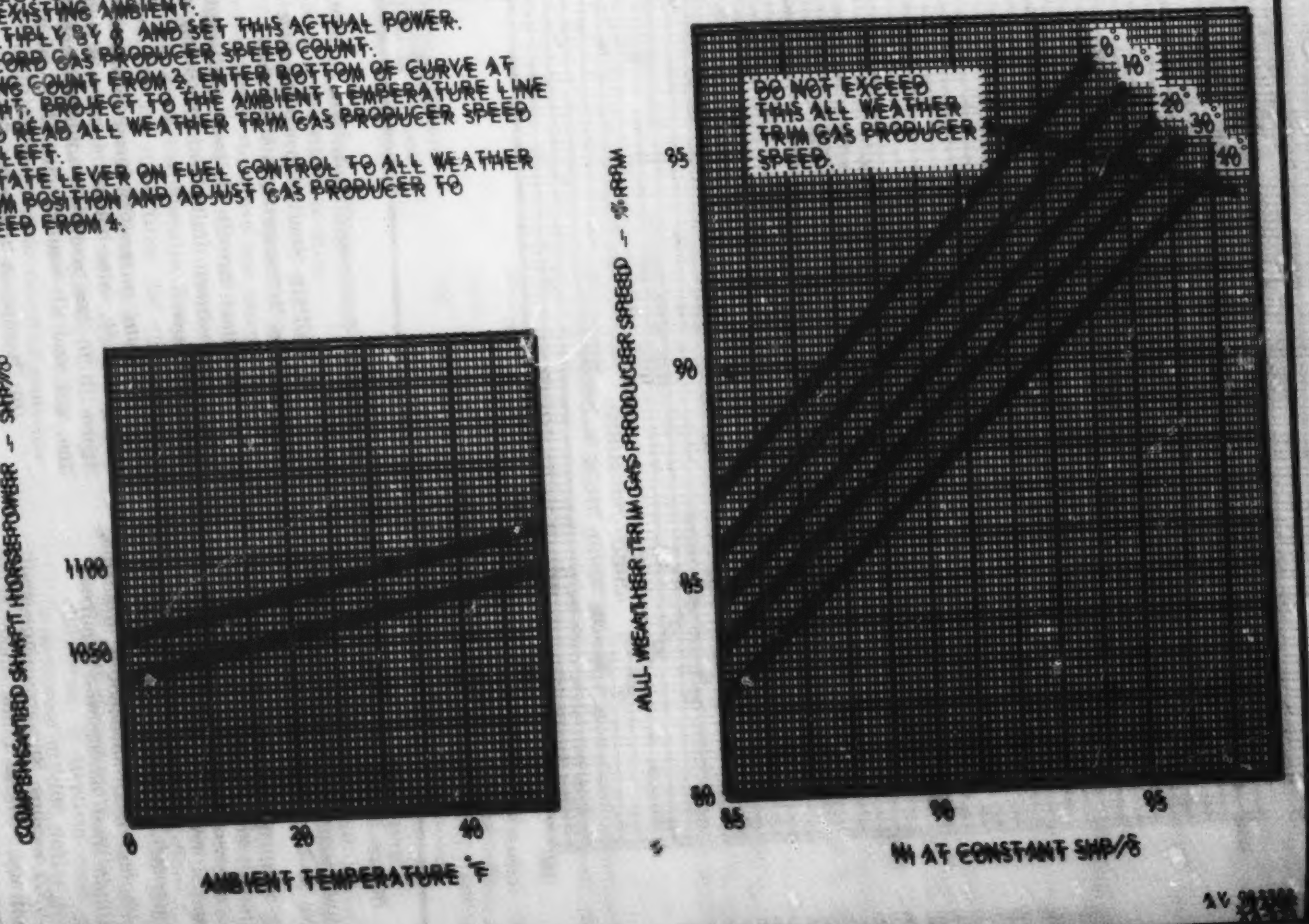


Figure 10-30. All Weather Trim Speed Calculation

(10) Slowly move THROTTLE N1 lever to re- ing, and check fuel rate. Fuel requirements ame as those taken in the preceding step (9), or minus 15 pph.

(11) Decelerate to ground idle.

(12) Rotate lever full clockwise and lockwire.

For T53-L-15/701, check military rated power ation:

(1) Determine compensated fuel flow as shown re 10-6 or 10-7.

(2) Multiply compensated fuel flow by compen- factor given in table 10-8. Result is actual low.

(3) Advance THROTTLE N1 lever until actual w is indicated on digital readout. Adjust in control lever to obtain optimum N2 speed. ure 10-9 or 10-10.

NOTE

If military rated power stop is reached actual fuel flow required is ob- tained, check shaft horsepower.

CAUTION

Throttle N1 and water-in control levers should be actuated simultaneously to re- duce possibility of power turbine over- speed.

(4) Record percent N2 speed. Then, using elec- orque indication readout and formula given in ph 10-27, step d, compute actual shaft horse- r.

CAUTION

On model T53-L-15 engines, do not exceed 1100 shaft horsepower. However, 1185 shaft horsepower is acceptable for trimming. On model T53-L-701 engines, do not exceed 1400 shaft horsepower. However, 1510 shaft horsepower is acceptable for trim- ming.

(5) Determine compensated shaft horsepower wn in figure 10-3 or 10-4.

(6) Multiply compensated shaft horsepower by ecting factor given in table 10-8. Result is um shaft horsepower required.

(7) Compare actual shaft horsepower, preced- ep (4), with minimum shaft horsepower required, step (6).

NOTE

If actual shaft horsepower is low, adjust military trim counterclockwise. If actual shaft horsepower exceeds maximum re- quired shaft horsepower, adjust military trim clockwise. If required shp is in ex- cess of 1185 for T53-L-15 or 1510 for T53-L-701, follow procedure in following steps w. or step w.

w. For T53-L-15, use this procedure when mili- tary trim or reverse mechanical stop cannot be set because ambient temperature is so low that required shaft horsepower is in excess of 1185 shp. (See fig- ure 10-31)

NOTE

Difference in N1 speed (Δ N1) when operating with power lever against mili- tary trim stop and when operating with power lever against cold weather stop is stamped on fuel control just below throttle quadrant. Record this Δ N1 on engine test log.

(1) Decelerate to ground idle.

(2) Adjust inlet guide vane feedback rod crank on actuator to "test" position. (See figure 10-31.)

(3) Install cold weather stop assembly (1-TCT 67688).

(4) Advance power lever against cold weather stop.

(5) Set N2 speed to approximately 78 percent.

(6) Adjust military trim to power determined from figure 10-32.

(7) Record a full reading.

(8) Decelerate to ground idle.

(9) Remove cold weather stop assembly (1-TCT 67688).

NOTE

Difference in N1 speed (Δ N1) when oper- ating with throttle against reverse me- chanical stop and when operating with throttle against cold weather stop is stamped on fuel control below the takeoff speed difference.

(10) Record Δ N1 stamped on fuel control for reverse power.

(11) Install reverse cold weather stop assem- bly (1-TCT 78841).

(12) Advance power lever against cold weather stop.

(13) Set N2 speed to approximately 78 percent.

(14) Adjust reverse mechanical stop to power determined from figure 10-32.

Figure 10-31. Feedback Rod Showing Run and Test Position Hole (T53-L-13)

(15) Record shunt reading.

(16) Decelerate to ground idle and remove cold weather stop assembly (LTCT6890).

(17) Adjust actuator crank to run position.

w. For T53-L-701, use following procedure when military trim or reverse mechanical stop cannot be set because ambient temperature is so low that required shaft horsepower is in excess of 1500 shp. (See figure 10-7).

(1) Decelerate to ground idle.

(2) Select compensated shaft horsepower to fall in band of curve at left of figure 10-53 at existing ambient.

(3) Multiply result from preceding step (2) by compensating factor given in table 10-8.

(4) Advance throttle and set this actual p
Maintain approximately 95.0 percent N2 speed.

(5) Record gas producer (N1) speed count.

(6) Using speed count from preceding
enter bottom of curve from figure 10-53 at right,
project to existing ambient from preceding
to ambient line, and read cold weather trim ga
ducer speed at left.

(7) Subtract Δ N1 stamped on fuel contr
military power from calculated gas produ
in preceding step (6).

(8) Decelerate to ground idle and insta
assembly (LTCT16788) on fuel control milit

(9) Advance power lever to cold w

(10) Trim gas producer to spee
preceding step (7) and record a full reading.

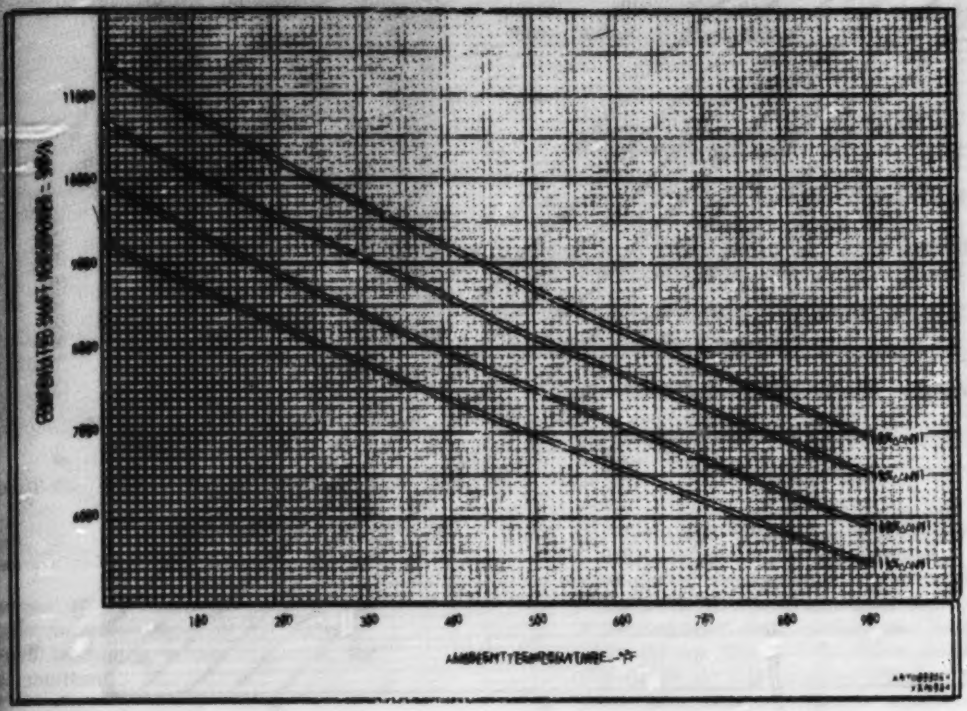


Figure 10-32. Compensated Shaft Horsepower Versus Ambient Temperature When Using Cold Weather Stop Graph (T55-L-16)

(11) Decelerate to ground idle and remove stop ly LTCT6788.

(12) Use same procedure to set reverse power se stop assembly LTCT6241 on fuel control setup), use the Δ N1 stamped on fuel control se power, and adjust gas producer speed verse mechanical stop. Record sheet reading.

(13) Decelerate to ground idle and remove stop ly LTCT6241.

for T55-L-16 only.) Adjust torque limiter 10-60), if required, to cut in at 3580 to 3600 t. Record set point on log sheet.

) If cut-in point is low, turn adjusting screw se.

) If cut-in point is high, turn adjusting screw clockwise.

y. Adjust oil pressures as required.

NOTE

Shut down engine to make adjustments.

z. Operate engine at takeoff (T55-L-7/7A) or military rated power (T55-L-16/700) for 5 minutes after trim has been set, and record a full reading after 2 minutes.

(1) Do not exceed maximum shaft horsepower.

(2) If required, set mechanical stop in control room.

aa. Record vibration data at 98.2 percent N2 (T55-L-16/700.))

ab. Operate 2 minutes at reverse power and record a sheet reading.

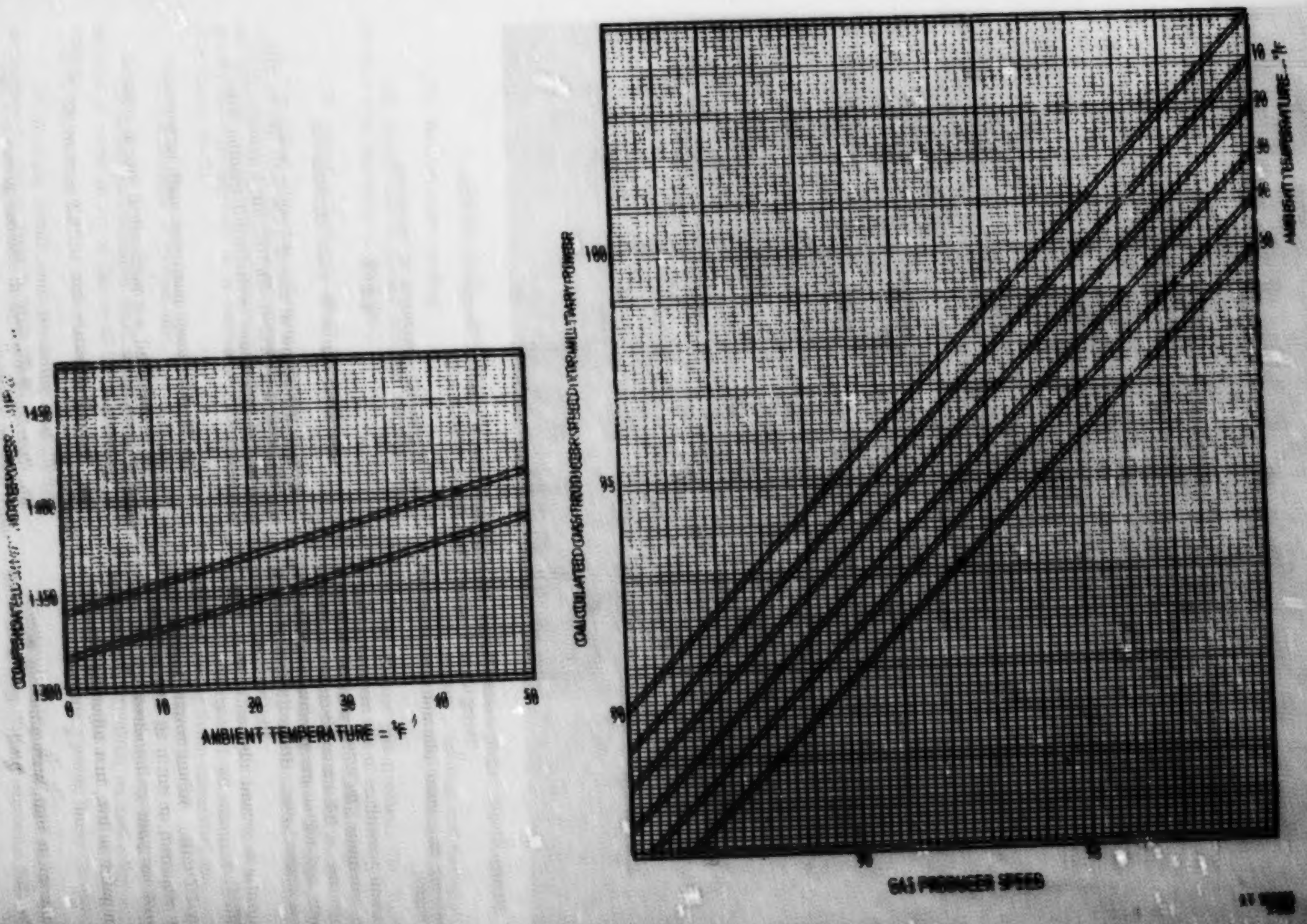


Figure 10-11. Cold Weather Engine Speed Calculation (T53-L-701)

TORQUE LIMITER
ADJUSTMENT
SCREW

gure 10-38. Torque Limiter Adjustment (T53-L-13)

NOTE

prevent N2 governor cut-in while set-ting reverse power trim, it may be nec-essary to secure governor linkage in the takeoff position.

) Requirements and limitations are the same (T53-L-7/7A) or military rated power 13/703).

) If required, set reverse mechanical stop in tion.

NOTE

e following CAUTION and steps ac. and apply to T53-L-7/7A engines.

CAUTION

ambient temperatures colder than 40°F, will be necessary to advance THROTTLE lever to takeoff stop in EMER. Accel-rate slowly to avoid surge. Decelerate to ound idle before returning to AUTO. When ambient temperature is above 75°F, switch ver to EMER at military rated power and vance THROTTLE N1 lever slowly until keoff rated power is reached. Record fuel ow and throttle position.

Set FUEL CONTROL switch (located on EC ntrol box) to EMER.

ad. Record fuel flow; then switch back to AUTO. Fuel flow in EMER should be 650 to 700 pph.

ae. Decelerate to ground idle and recheck ground idle trim. Adjust if required. (Do not change water brake load.)

af. Accelerate to flight idle and check flight idle trim. Adjust if necessary.

NOTE

Following steps ag. and ah. apply to T53-L-7/7A engines.

ag. Set FUEL CONTROL switch to EMER.

ah. Record fuel flow; then switch back to AUTO. Fuel flow in emergency should be 95 to 125 pph.

ai. Operate engine at flight idle for one minute and record a sheet reading.

aj. Perform acceleration check as follows:

(1) Set MANIFOLD SOLENOID switch to ON.

NOTE

Accelerations will be timed to that P_3 at which 95 percent of takeoff power (T53-L-7/7A) or military rated power (T53-L-13/703) is attained, except that if the required shaft horsepower exceeds 1100 shp for T53-L-7/7A, 1160 shp for T53-L-13, or 1400 shp for T53-L-703, the acceleration will then be timed to the P_3 at which 1045 shp (T53-L-7/7A), 1100 shp (T53-L-13), or 1330 (T53-L-703) is attained. If during accelerations a surge is experienced, pull back to ground idle immediately and check bleed control and variable inlet guide vane (T53-L-13/703 only) operation. If bleed control is functioning properly, it will remain open during most of the acceleration and will close just before the acceleration is completed. Power lever movement shall be accomplished in one second or less.

(2) Jam power lever to takeoff power (T53-L-7/7A) or military rated power (T53-L-13/703) stop and start clock simultaneously.

(3) Stop clock and record time and maximum exhaust gas temperature at P3 determined from preceding note.

(a) Maximum time for acceleration is 4 seconds (T53-L-7/7A/13) or 5 seconds (T53-L-703).

(b) Maximum exhaust gas temperature is 1400°F but shall not exceed 1200°F (T53-L-7/7A) or 1250°F (T53-L-13/703) for more than 5 seconds.

(c) Inlet guide vanes should open fully within limits of figure 10-23 or 10-24 (T53-L-15/701 only).

(d) Bleed band should close after the acceleration is completed.

(e) Adjustments to pressure regulating valve or maximum fuel are not permitted.

(f) If accelerations are to be repeated, decelerate to flight idle and cool engine for 2 minutes.

(g) Operate one minute at takeoff power (T53-L-7/7A) or military rated power (T53-L-15/701) after acceleration is completed.

(h) Record a short reading.

CAUTION

Do not adjust pressure regulating valve.

ak. Decelerate to flight idle.

(1) Operate engine at flight idle for 3 minutes and record a full reading.

(2) Rapidly advance THROTTLE N1 lever to reverse power stop and simultaneously start clock.

(3) Stop clock. Record acceleration time at predetermined P_3 and maximum exhaust gas temperature.

NOTE

Maximum time for acceleration is 5 seconds.

(4) Bleed band should close after acceleration is completed.

al. Decelerate to ground idle.

(1) Operate 2 minutes at ground idle.

(2) Record full reading.

am. Check acceleration to takeoff power (T53-L-7/7A) or military rated power (T53-L-15/701).

(1) Refer to NOTE following step aj(1).

CAUTION

To prevent N2 overspeed, the water brake setting must be increased during acceleration and N1 must be reduced immediately after timing.

NOTE

On T53-L-15, water brake setting must be reduced to accomplish the acceleration check or the torque limiter may cut in. The amount of reduction required varies and must be determined by trial.

(2) Jam power lever to military stop and clock simultaneously.

(3) Stop clock and record time and exhaust temperature.

(a) Maximum time for acceleration is 8 seconds for T53-L-7/7A/15 or 9 seconds for T53-L-701.

(b) Maximum exhaust gas temperature is 1400°F, but do not exceed 1200°F (T53-L-7/7A) or 1250°F (T53-L-15/701) for more than 5 seconds.

(c) Bleed band should close after acceleration is completed.

(d) Adjustments to pressure regulating valve or maximum fuel are not permitted.

(e) Decelerate to ground idle and set fuel solenoid switch to OFF.

an. Using compatible curve of figure 10-5, 10- or 10-7, determine compensated fuel flow requi for 75 percent normal rated power.

ao. Multiply compensated fuel flow by compe sating factor given in table 10-8. Result is maxi actual fuel flow allowable to obtain 75 percent nor rated power.

ap. Using compatible curve of figure 10-12, 10- or 10-14, determine compensated slip requi percent normal rated power.

aq. Multiply compensated slip by compensati factor given in table 10-8. Result is minimum required for 75 percent normal rated power.

NOTE

Following step ar. is not required for T53-L-7/7A if test propeller is being used.

ar. Select optimum N2 speed from figure 10- 10-9, or 10-10.

as. Advance THROTTLE N1 lever to maxi fuel determined from step ao.

CAUTION

Be certain that water brake is sufficiently loaded before advancing throttle.

at. Reset N2 speed if necessary.

au. Compute actual shaft horsepower

(1) Using N2 speed count, plot out torque value if using test propeller. If using brake, record electronic torque indication.

(3) Then using formula given in paragraph step d, compute actual shaft horsepower. Do d minimum shaft horsepower by more than

(4) Operate at this power setting for 5 minutes. full reading after 2 minutes.

r. Repeat steps an. through au. for 100 percent l rated power.

(1) Operate engine at 100 percent normal rated for 30 minutes. Record full readings after 5, 25 minutes.

(2) Check oil consumption during last 15 min-

NOTE

The following steps aw., ax., and ay., apply to T53-L-7/7A engines only.

. Repeat steps an. through au. for military power.

(1) Operate engine at military rated power for .

(2) Record a full reading after 2 minutes.

. Check operation of anti-ice valve by setting AIR switch on DC MASTER control box to ON. tion is indicated by activation of panel warn- light and annunciator.

NOTE

Silence annunciator by depressing TEST-ACKNOWLEDGE switch.

y. Set HOT-AIR switch to AUTOMATIC. Pan- warning light should go out.

. Repeat steps an. through au. for takeoff power -7/7A) or military rated power (T53-L-15/701).

(1) Operate engine at takeoff power (T53-L-7/ r 5 minutes or military power (T53-L-15/701) minutes. Record a full reading after 2 minutes.

(2) On T53-L-15/701, check operation of anti- by setting HOT-AIR switch on DC MASTER box to ON. Operation is indicated by activa- panel warning light and annunciator.

NOTE

Silence annunciator by depressing TEST-ACKNOWLEDGE switch.

. On T53-L-15/701, set HOT-AIR switch to . Panel warning light should go out.

. Decelerate to ground idle.

bc. Cool engine at ground idle or flight idle for 2 minutes or until power turbine bearing scavenge oil temperature decreases below 300°F.

bd. Simultaneously close conditioning N2 lever (toward operator), FUEL SOL switch, and energize TIMER-START switch.

be. Observe N1 percent SPEED and N2 percent SPEED indicators. Stop timer when engine coast-down is complete (N1 percent indicator reaches zero). Record engine coastdown time on engine test log.

NOTE

Panel warning lights and annunciator horn will energize to indicate low oil and fuel pressure during engine coastdown. Depress TEST-ACKNOWLEDGE switch to silence horn.

bf. Disconnect fuel control ram air tube from inlet housing, and connect to P-1 bellows pressurizing system. (Connect to P-2 on deck instrumentation console.) (See figure 10-35.)

bg. Start engine. (Refer to paragraph 10-34.)

(1) Operate one minute at reverse power and record shaft reading.

NOTE

The following step (2) applies to all engines being tested with a water brake. If the T53-L-7/7A is being tested with test propeller, follow procedures outlined in following step bi. for checking topping governor cut in.

(2) While operating at reverse power unload water brake and check topping governor cut-in.

NOTE

On T53-L-15 engines the torque limiter may cut in. If this occurs, then fuel flow and N1 may increase until the topping governor cuts in. This will be indicated by a drop in N1 or fuel flow as the engine loading decreases.

(a) Check average fuel rate and average N2 against curve (figure 10-36, 10-37, or 10-38).

(b) Do not exceed 104 percent N2.

(c) If not within limits of curve, replace topping governor.

bh. Decelerate to ground idle and check [illegible] (T53-L-7/7A) as follows:

(1) Set MANIFOLD SOLENOID switch to ON.

(2) Check that THROTTLE N2 lever is full forward.

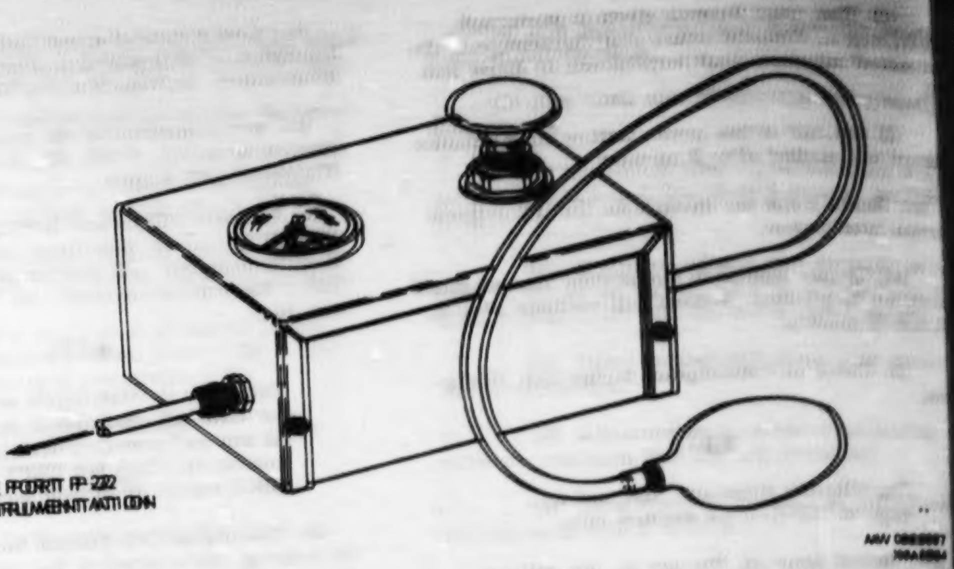


Figure 10-35. Portable P-1 Bellows Pressure Unit

(3) Using procedure as outlined in preceding steps s. or u. operate engine at takeoff power for 2 minutes.

(4) Perform a series of waveoffs in rapid succession from 85, 80, 75, 70, 65, 60, and 55 percent N1 speed.

NOTE

If applicable, the water in control lever shall be locked in position during waveoff checks.

Snap THROTTLE N1 lever from takeoff power to allow N1 speed to decelerate, and return THROTTLE N1 lever to takeoff power for each of the N1 speeds. THROTTLE N1 lever movement in either direction shall be accomplished in less than one second. The transient solenoid should open when the throttle is returned to takeoff and should remain open until the acceleration is completed.

(5) If surge is encountered, immediately retard THROTTLE N1 lever to ground idle until engine operates normally.

(6) If no surge is encountered, apply 20 ± 0.5 inches H₂O to P-1 bellows, using portable P-1 pressure unit. (See figure 10-35).

NOTE

Three-quarters psi on gage is equivalent to 20 inches H₂O.

(7) Repeat waveoffs from 85, 80, 75, 70, 65, 60, and 55 percent N1 speed.

(8) If unable to obtain correct surge margin, replace fuel control.

NOTE

If replacement of fuel control fails to correct surge, reject engine. Do not reject engine for surge at waveoff check from 55 percent N1.

(9) Record results of waveoff check on engine test log.

bi. Check transient operation (T53-L-13B/703) as follows:

(1) Set military rated power.

(2) Apply 19.5 to 20.5 inches H₂O to P-1 bellows system.

(3) Set gas producer speed (N1) at 80 percent and stabilize without changing water brake load.

(4) Rapidly advance throttle to military rated power position.

(5) When gas producer speed has reached producer speed used during acceleration check (to preceding step aj)), reset gas producer speed, repeat jam accelerations from 85, 80, and 70 percent gas producer speed as in preceding step (4).

bj. Shut down engine as outlined in preceding steps bb. through be.

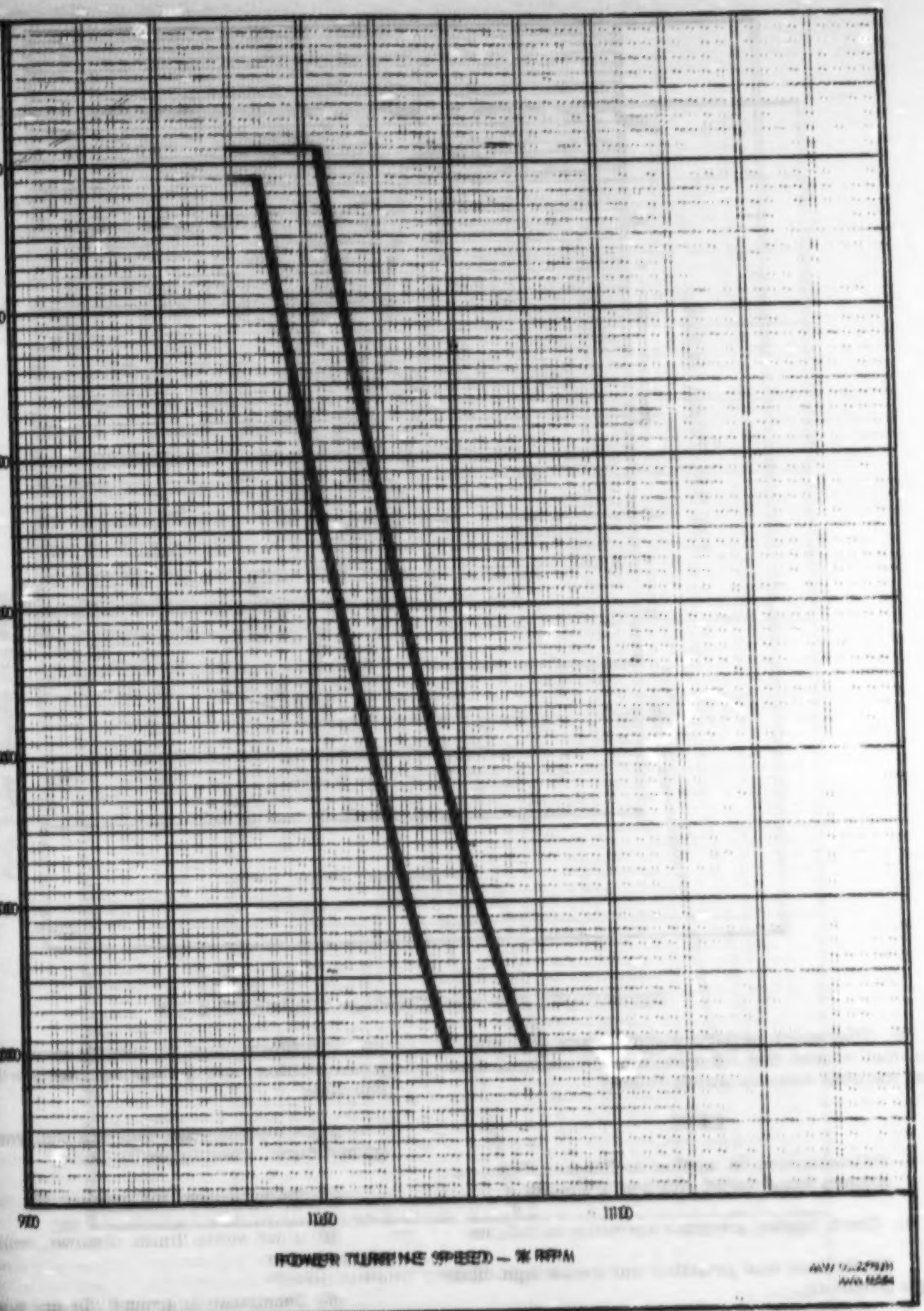


Figure 10-38. Overspeed Governor Limits (T53-L-703)

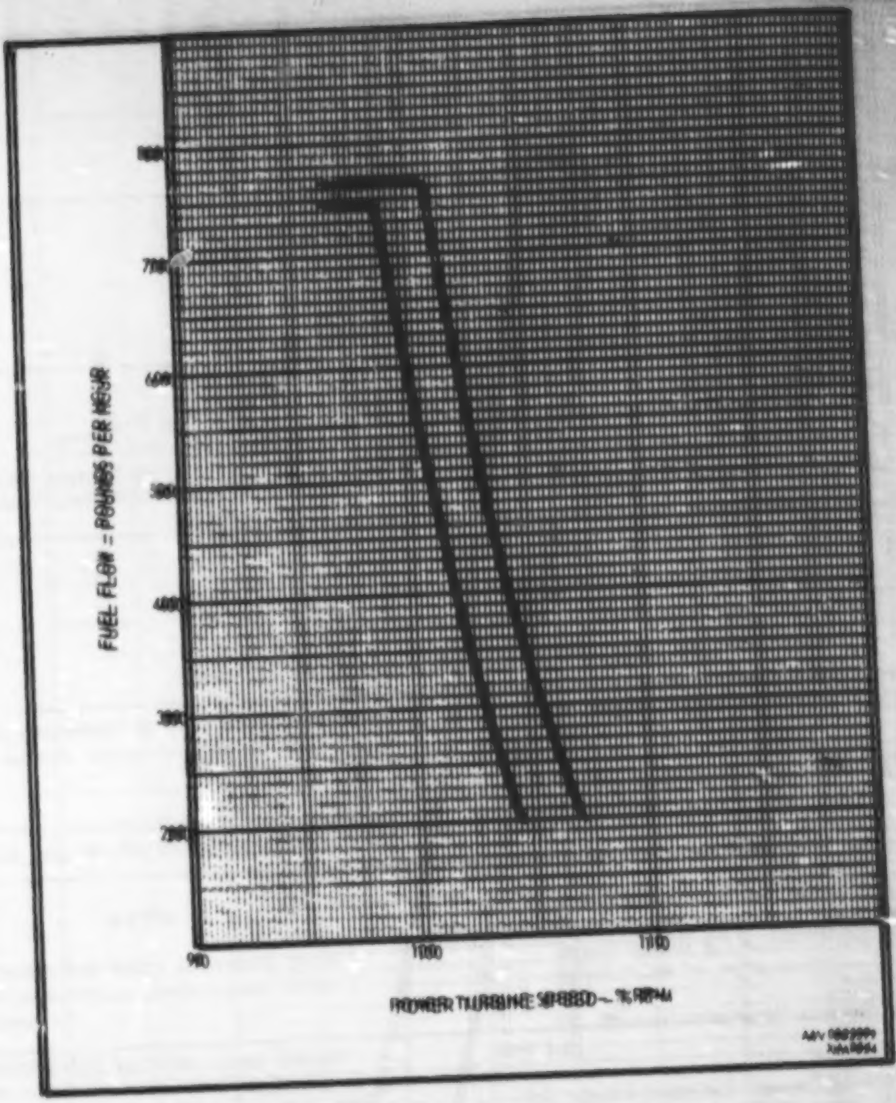


Figure 10-37. Overspeed Governor Limits (T53-L-13)

bk. Disconnect portable P-1 pressure unit, connect fuel control ram air tube to inlet housing and set fuel manifold solenoid switch to OFF.

NOTE

Following step bl. applies to T53-L-7/7A engines being tested with test propeller.

bl. Check topping governor operation as follows:

(1) Remove test propeller and install light blade angle propeller.

(2) Start engine as outlined in preceding steps m. and n. or p. and q.

(3) Slowly move N1 throttle lever into
power position until the topping governor limits
fuel rate.

(4) Check average fuel rate and average
against curve. (See figure 10-38)

(5) Do not exceed 104 percent N2.

(6) If not within limits of curve, replace
ping governor.

(7) Decelerate to ground idle and stop
as outlined in preceding steps bb. through be.

10-38. PENALTY APPLICATIONS. Not

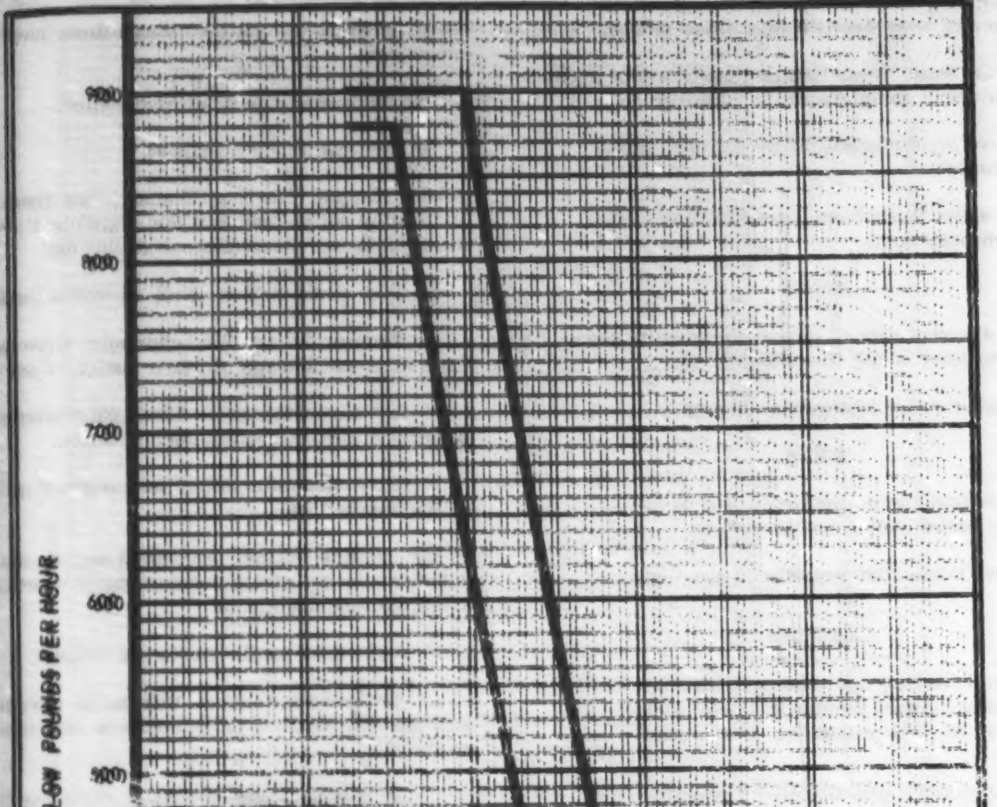


Figure 10-38. Overspeed Governor Limits (T53-L-703)

10-57. Preservation and Removal of Engine Following Test Run. Proceed as follows:

NOTE

Following steps a. through d. apply if engine has been tested with a water brake.

a. At the water tower trailer, position fan, H2O boost, and tower pump circuit breakers to off.

b. Set water in control lever to closed (away from operator).

c. Set water brake back pressure lever open (away from operator).

NOTE

In following step d., preserve water brake as outlined in TM 55-4920-317-15.

d. Remove water brake from engine.

NOTE

Following step e. applies if engine has been tested with a test propeller.

e. Remove test club propeller from engine.

CAUTION

When installing test club propeller on storage support provided, tighten locking nut to 1000 pound-feet torque maximum.

f. Remove and clean oil filter element.

g. Immerse oil filter element in clean lubrication oil (item 6, table 2-2). Reassemble oil filter.

h. Preserve fuel control.

(1) Disconnect electrical source to igniter box.

(2) Remove fuel inlet, inlet pressure, and pump pressure lines from fuel control. Plug or cap pressure ports. Remove bleed plug from aft face of topping governor and drain all fuel from control.

(3) Using pressure can containing MIL-L-6081 oil at 30 psig, flow preservative through fuel control while motoring engine with starter. With throttle in off position, allow oil to circulate through control. After oil is discharged from topping governor bleed plug, replace plug.

(4) After preservation of fuel control, reconnect main fuel lines and torque to required value; cap all open fittings.

i. Plug or cover all exposed openings on engine.

j. Drain accessory drive gearbox of excessive oil and clean chip detector.

k. Lockwire fuel control adjustments.

l. Record completion of preservation on data sheet and tag engine to indicate preservation has been accomplished.

m. Ensure that all test connections have been d connected.

n. Remove engine from test trailer.

o. Remove all test fittings.

10-58. Engine Test Log Checks. (See figure 10- Following engine test run, the engine test log shal be examined to determine the following:

a. Seal drain leakage shall be within limits.

b. Neither N1 nor N2 tachometer drive pads have external leakage of more than 2 cc per hour

c. Oil temperatures and bearing scavenge tem peratures shall be within specification.

d. Oil consumption shall be computed and ent on engine test log.

10-59. Engine Rating. Accepted engines shall be rated for N1 speed and exhaust gas temperature using the test log sheets.

a. Determine engine rating as follows:

(1) Determine correction factor for existin ambient temperature in accordance with figure 1 or 10-40.

(2) Multiply takeoff (T53-L-7/7A) or (T53- 15/701) gas producer speed by correction factor termined in preceding step (1). Result is stan day gas producer speed (N1).

b. For T53-L-7/7A engines, if takeoff trim w set using the all-weather trim, proceed as follo

(1) To determine actual takeoff speed, add percent with all-weather trim turned on to the g producer speed.

(2) Follow procedure in preceding steps.

c. For T53-L-15/701 engines if cold weather stop (LTCT87/88) was used, military gas produ speed will be equal to recorded N1 speed plus

d. Determine takeoff (T53-L-7/7A) or milit (T53-L-15/701) rated exhaust gas temperature follows:

(1) Find exhaust gas temperature and temperature readings recorded at takeoff (T53- 7/7A) or military (T53-L-15/701) power during checkout.

(2) Find difference in exhaust gas tem between actual takeoff (T53-L-7/7A) or milita

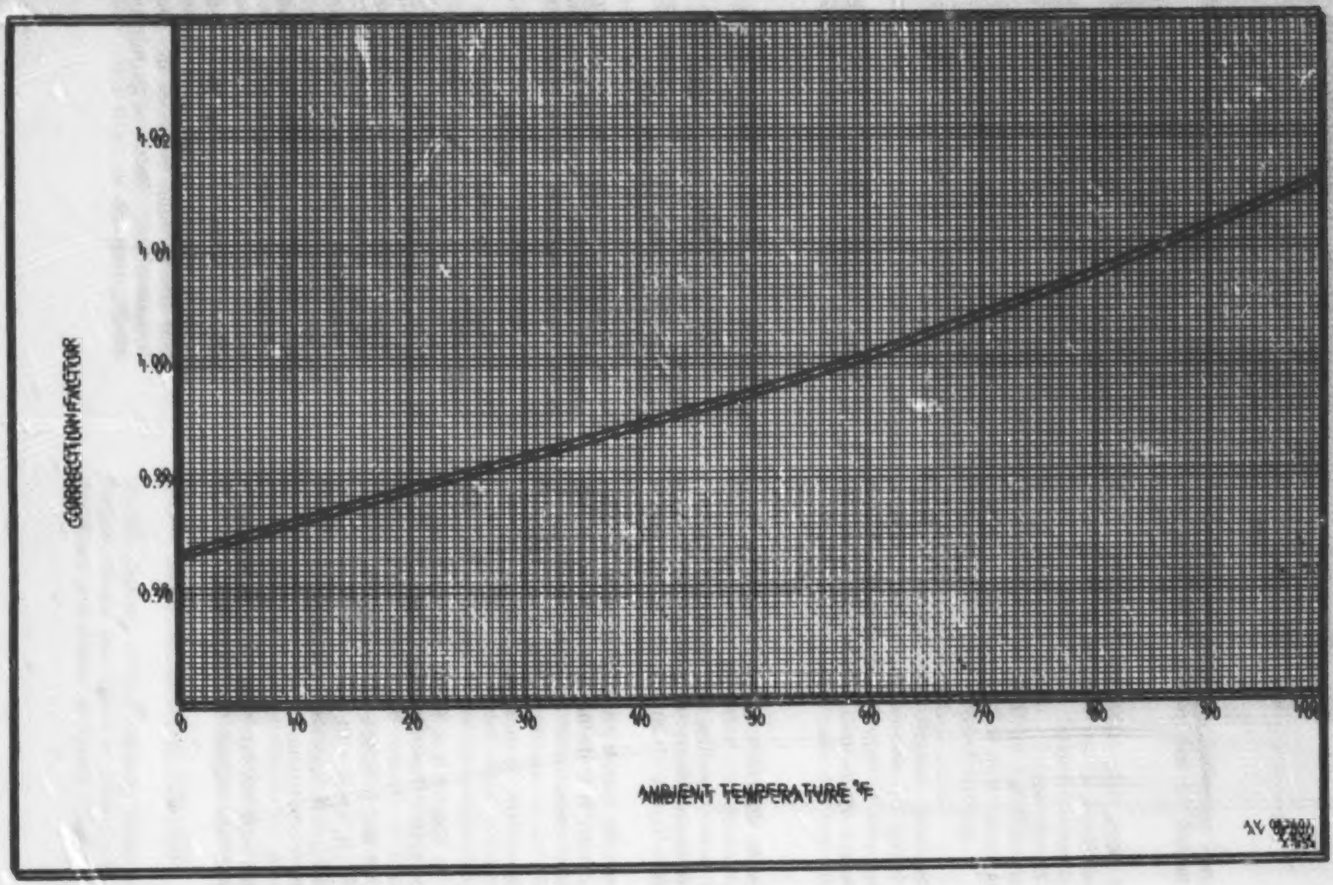


Figure 10-39. Correction Factor for Determining Standard Day Gas Producer Speed (T53-L-7/7A)

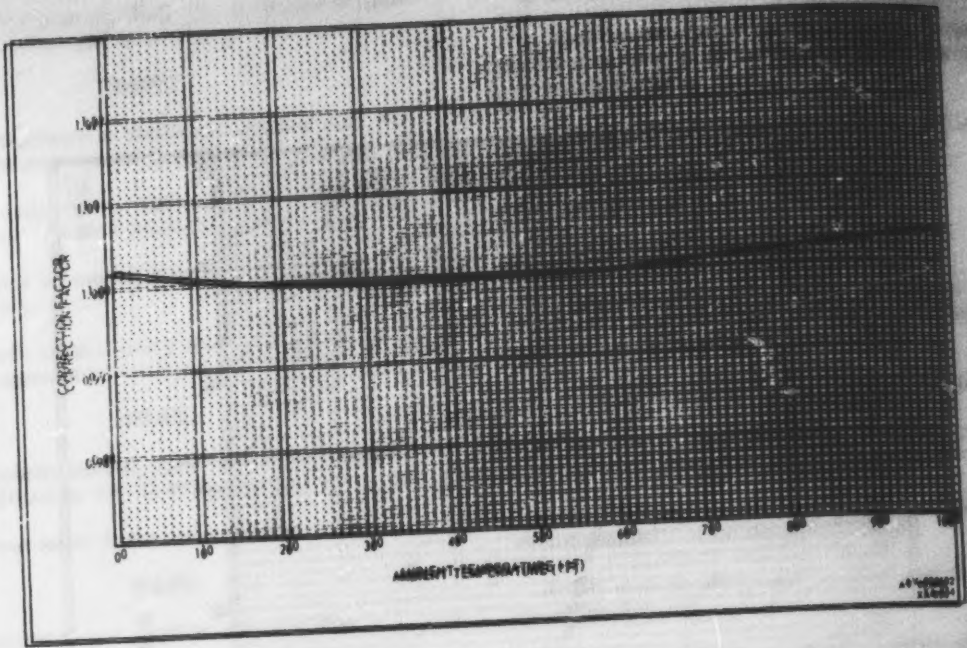


Figure 10-40. Correction Factor for Determining Standard Day Gas Producer Speed (T55-L-15/701)

(T55-L-15/701) power reading and maximum allowable exhaust gas temperature for appropriate ambient temperature. (See figure 10-18, 10-19, or 10-20.)

(3) Subtract the temperature difference obtained in preceding step (2) from the maximum allowable exhaust gas temperature at 59°F. Result is rated takeoff (T55-L-7/7A) or military (T55-L-15/701) exhaust gas temperature from a standard day (59°F) 29.92 in. Hg.

(4) Enter on Engine Log Sheet, the necessary information to complete the following sentence:

"This engine will produce rated
power at % N1 speed with a °F
exhaust gas temp under standard
day sea level conditions."

(5) Record required information on engine or overhaul data plate and engine test log sheet.

(6) If new data differs from that stamped
engine data or overhaul plate, paint over or o
invalid data and stamp new data.

e. Record propeller (output) shaft torque(
sured in pound-feet) versus differential torq
pressure on engine or overhaul data plate.

NOTE

The T55-L-7/7A engine data plate will be stamped in psi for propeller shaft torque of 3400 pound-feet. T55-L-15 engine data plate will be stamped in psi for propeller shaft torque of 3600 pound-feet. The T55-L-701 engine data plate will be stamped in psi and milliamps for propeller shaft torque of 3580 and 4705 pound-feet.

To obtain the torque in psi at these values, extend torquemeter pilot average line to value required and note torque in psi. (Refer to paragraph 10-27, step d.)

CHAPTER 11

TORQUES AND DIMENSIONAL LIMITS

SECTION I

TORQUE VALUES

RAL.

his section contains standard torque tables,
l torque tables, and their reference figures
ructions for use of torque wrenches.

ENERAL INSTRUCTIONS FOR USE OF
WRENCHES.

ORQUE WRENCH CALIBRATION. Torque
es must be calibrated frequently by using
ucible measured lever arm. Inaccurate
may occur because of abuse or constant
ot check one wrench against another.

ECOMMENDED TORQUE WRENCH SIZES.
11-1 lists the recommended torque wrench
s.

e 11-1. Recommended Torque Wrench Sizes

IRED TORQUE	TORQUE WRENCH
5 pound-inches	30 pound-inches
o 100 pound-inches	150 pound-inches
o 600 pound-inches	600 pound-inches
o 100 pound-feet	150 pound-feet
o 200 pound-feet	250 pound-feet
o 1000 pound-feet	1000 pound-feet

ORQUE WRENCH EXTENSIONS AND
ERS. Extensions or adapters may be used
torque wrench. Because extensions or
rs change the length of the torque arm for-
e scale is calibrated, torque applied at the
he extension or adapter is not correctly in-
on the scale and must be calculated. When
ensions or adapters, apply the manual
at the calculated arm length at the center of
le. When substituting values in formulas,
units to obtain an answer in pound-inches,
units, to obtain an answer in pound-feet.
nterline of the wrench and the wrench ex-
r adapter shall align as shown in figure

11-6. To determine the indicated torque, using extensions or adapters, use the formula shown in figure 11-1.

11-7. PROCEDURE FOR APPLYING TORQUE. Clean parts to be tightened in drycleaning solvent (item 28, table 2-2). Unless instructed otherwise, do not lubricate parts. Torque should be applied slowly and evenly until the specified torque value is reached, and then held at this value until the nut, bolt, or screw has stopped turning.

11-8. When applying torques, proceed in steps of gradually increasing tension. Tighten the bolts, screws, or nuts in a staggered sequence until the part is firmly seated; then apply a gradual increase in torque on each part until the specified torque value is reached.

11-9. When lockwiring holes are to be aligned, the following torque procedure is recommended:

a. First tighten nut or bolt to minimum torque value.

b. If lockwiring holes do not align, continue to tighten the part until holes do align, but do not exceed maximum torque value specified for the operation.

c. If holes still do not align, select another nut or bolt and retighten to the recommended torque value.

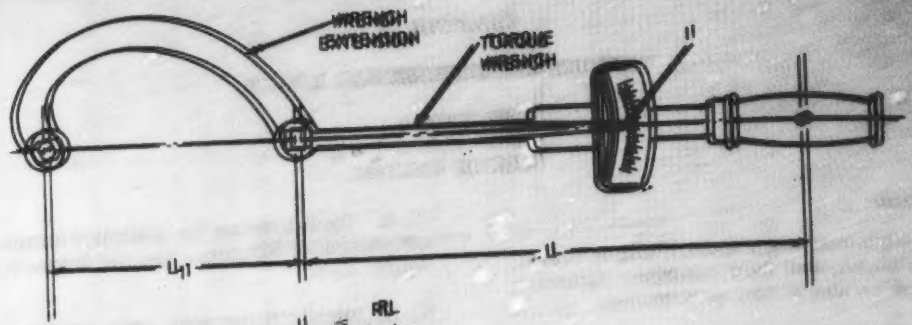
d. For lockwiring parts other than pins, a selection of parts may be necessary to obtain proper locking position in the specific torque range.

11-10. STANDARD TORQUE VALUES.

11-11. Standard torque values for general application are listed in table 11-2. Standard torque values for stepped and straight studs are shown in figure 11-2.

11-12. SPECIAL TORQUE VALUES.

11-13. Special torque values, under or over standard torque values are listed in table 11-3. Special torque locations are shown in figure 11-3.



$$I = \frac{RL}{L+L_1}$$

I = Indicated torque on wrench.

R = Required torque of bolt or nut.

L = Length of torque wrench (wrench head to midpoint of handle) in inches.

L_1 = Length of extension or adapter (center to center distance) in inches.

Figure 11-1. Application of Torque Wrench Extension Formula

Table 11-2. Standard Torque Values

STANDARD STEEL TORQUED DRY SCREWS, BOLTS, AND NUTS (POUND-INCHES)		
THREAD SIZE	SLOTTED-HEAD SCREWS	HEXAGON-HEAD BOLTS AND NUTS
2-56	2-3	
3-48	3-4	
4-40	5-6	
5-40	6-7	
6-32	7-9	
8-32	10-12	
10-32	18-20	40-45
7/32-24	22-25	65-70
1/4-28	30-35	70-95
5/16-24	40-45	120-155
3/8-24	55-60	200-225
7/16-20	80-90	400-475
1/2-20 or -13	100-110	550-700
9/16-18		750-1050
5/8-18		1050-1450

TAPER PIPE-THREAD FITTING AND PLUGS (POUND-INCHES)		
SIZE	IN STEEL CASE	IN BRASS OR ALUMINUM CASE
1/16-27	35-40	10-15
1/8-27	75-125	30-40
1/4-18	200-250	70-85
3/8-18	300-375	95-110
1/2-14	450-600	140-160
3/4-14	500-650	175-200
1-11-1/2	650-700	220-260

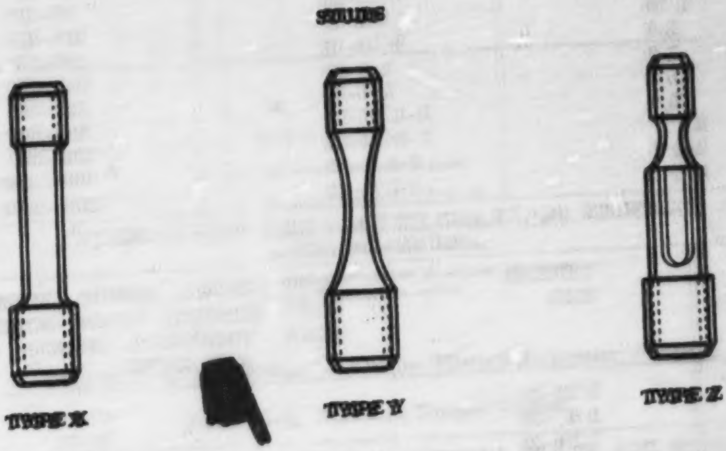
Table 11-2. Standard Torque Values (Cont)

JAM NUTS FOR BULKHEAD FITTINGS		
TUBING OUTSIDE DIAMETER	THREAD SIZE	TORQUE (POUND-INCHES)
1/8	5/16-24	35-50
3/16	3/8-24	65-80
1/4	7/16-20	85-105
5/16	1/2-20	105-125
3/8	9/16-18	120-150
1/2	3/4-16	240-280
5/8	7/8-14	320-380
3/4	1-1/16-12	500-600
1	1-5/16-12	720-880
1-1/8	1-5/8-12	960-1200
1-1/2	1-7/8-12	1200-1440

JAM NUTS, BOLTS AND FITTINGS USED WITH GASKETS (POUND-INCHES)		
TUBING OUTSIDE DIAMETER	THREAD SIZE	NUTS (MS9099, MS9100, MS9200, MS9201), PLUG (MS9015), UNION (AN815), BOLT - UNIVERSAL (BANJO), FITTING (AN774 AND AN775)
1/8	5/16-24	45-50
3/16	3/8 -24	60-70
1/4	7/16-20	90-100
5/16	1/2 -20	120-130
3/8	9/16-18	150-160
1/2	3/4 -16	275-300
5/8	7/8 -14	375-400
3/4	1-1/16-12	550-600
1	1-5/16-12	800-900
1-1/8	1-5/8 -12	900-1000
1-1/2	1-7/8 -12	900-1000

TUBE AND HOSE END FITTINGS (B-NUTS)						
TUBING OD INCHES	FLARED TUBING NUTS				HOSE END FITTINGS	
	ALUMINUM-ALLOY TUBING		STEEL TUBING		STEEL	
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
3/16	—	—	90	100	70	100
1/4	40	65	135	150	70	120
5/16	60	80	180	200	85	180
3/8	75	125	270	300	100	250
1/2	150	250	450	500	2[illegible]	420
5/8	200	350	650	700	300	480
3/4	300	500	900	1000	500	850
1	500	700	1200	1400	700	1150
1-1/4	600	900	—	—	—	—
1-1/2	600	900	—	—	—	—

TYPES X AND Y ARE
DRIVEN FROM NUT END.
TYPE Z IS DRIVEN FROM
FLAT ON STUD.



STEPPED STUD TORQUE VALUES
(POUND-INCHES)

THREAD SIZE		TYPE X	TYPE Y	TYPE Z
NUT END	STUD END			
10-32	1/4-20	20 to 50	50 to 75	50 to 125
1/4-28	5/16-18	50 to 100	100 to 160	100 to 350
5/16-24	3/8-16	100 to 200	175 to 325	175 to 600
3/8-24	7/16-14	175 to 475	250 to 525	250 to 1000
7/16-20	1/2-13	250 to 725	400 to 850	400 to 1300
1/2-20	9/16-12	400 to 1050	600 to 1050	600 to 2000
9/16-18	5/8-11	600 to 1500	900 to 1700	900 to 3000
5/8-18	11/16-11	900 to 2400		

STRAIGHT STUD TORQUE VALUES
(POUND-INCHES)

THREAD SIZE		TYPE X	TYPE Y	TYPE Z
NUT END	STUD END			
4-48	4-40	3 to 7		
6-40	6-32	8 to 14		
8-36	8-32	18 to 25		
10-32	10-24	25 to 35	50 to 95	50 to 105
1/4-28	1/4-20	50 to 95	100 to 225	100 to 250
5/16-24	5/16-18	100 to 225	175 to 375	175 to 400
3/8-24	3/8-16	175 to 375	250 to 400	250 to 700
7/16-20	7/16-14	250 to 600	400 to 700	400 to 1000
1/2-20	1/2-13	400 to 1050	500 to 1050	600 to 1500
9/16-18	9/16-12	600 to 1400	700 to 1400	900 to 2000
5/8-18	5/8-11	900 to 2700		

AAV [illegible]

Figure 11-2. Stepped and Straight Stud Torque Values

Table 11-3. Special Torque Values

NO.	FIG. NO.	DESCRIPTION	MINIMUM	MAXIMUM
		The following references represent special torque limits expressed in pound-inches or pound-feet. When the same value is used in the minimum and maximum column, tighten as close as possible to this value.		
11	11-3	Reduction Gear Assembly Thrust Nut	680 pound-feet	680 pound-feet
	11-3	Reduction Gear Assembly Planet Gear Left-Hand Nut	14000 pound-inches	16000 pound-inches
	11-3	Sun Gearshaft Retaining Bolt	500 pound-feet	600 pound-feet
	11-3	Reduction Gear Assembly Retaining Nut	700 pound-inches	775 pound-inches
	11-3	Rear Bearing Support Bolts	700 pound-inches	935 pound-inches
	11-3	Carrier to Propeller Shaft Spanner Nut	950 pound-feet to 1000 pound-feet. Release to 0 pound-feet. Retorque to 465 pound-feet to 555 pound-feet.	
	11-3	Rear Bearing Support Screws	765 pound-inches	775 pound-inches
	11-3	Reduction Gear Assembly Planet Gear to Carrier Attaching Bolts	2250 pound-inches	3350 pound-inches
	11-3	Accessory Drive Gearbox Attaching Bolt	2850 pound-inches	3325 pound-inches
	11-3	Accessory Drive Gearbox Attaching Bolt	4000 pound-inches	4875 pound-inches
	11-3	Accessory Drive Gearbox Attaching Bolt	4000 pound-inches	4875 pound-inches
	11-3	Accessory Drive Gearbox Attaching Bolt	1000 pound-inches	1220 pound-inches
	11-3	Torquemeter Valve to Cylinder	1850 pound-inches	2000 pound-inches
	11-3	Sun Gearshaft Retaining Bolt	500 pound-feet	600 pound-feet
	11-3	Reduction Gear Assembly Retaining Nut	700 pound-inches	775 pound-inches
	11-3	Shim and Plate to Rear Bearing Support Bolt	700 pound-inches	775 pound-inches
	11-3	Propeller Shaft Spanner Nut	1200 pound-feet	1400 pound-feet
	11-3	Nuts Securing Taper Pins or Bolts Through Hollow Dowels in Compressor Housing Halves	300 pound-inches	335 pound-inches
	11-3	Nuts Securing Bolts Through Compressor Housing Halves	300 pound-inches	335 pound-inches
	11-3	Air Deflector Attaching Bolts	700 pound-inches	775 pound-inches
	11-3	W-Band Coupling Nuts	2000 pound-inches. Release to 0 pound-inches. Retorque to 1465 pound-inches to 1555 pound-inches.	

Table III-3. Special Torque Values (Cont)

REF. NO.	FIG. NO.	DESCRIPTION	MINIMUM	MAXIMUM
22	III-3	Second Stage Turbine Support to Power Turbine Nozzle and Cylinder Attaching Bolts	700 pound-inches	775 pound-inches
23	III-3	Oil Strainer Housing	800 pound-inches	900 pound-inches
24	III-3	Oil Nozzle Adapter	500 pound-inches	600 pound-inches
25	III-3	Power Turbine Tube	1000 pound-inches	1100 pound-inches
26	III-3	Exhaust Diffuser to Second Stage Turbine Rotor Screw	200 pound-inches	300 pound-inches
27	III-3	Rear Bearing Housing to Second Stage Turbine Rotor Spanner Nut	2225 pound-feet	2250 pound-feet
28	III-3	Combustor Turbine Internal Wrenching Nut	Apply Ease-Off 990 or Molykote anti-seize thread compound to threads of nut. Tighten nut to 1000 pound-feet torque. Loosen and remove nut. Retighten power shaft bolt (4, figure 3-15) to 1925 to 2000 pound inches torque. Install internal wrenching nut (5) and tighten to 50 pound-feet torque.	
29	III-3	Power Shaft Bolt	Apply Ease-Off 990 or Molykote anti-seize thread compound to threads of bolt. Tighten bolt to 1925 to 2000 pound-inches torque.	
30	III-3	Rear Bearing Cover Bolts	700 pound-inches	775 pound-inches
31	III-3	Power Turbine Oil Tube Connector	800 pound-inches	1000 pound-inches
32	III-3	Fuel Vaporizer Adapter Nuts	Tighten nuts to 1700 to 1800 pound-inches torque. Lockwire nuts in pairs at four locations. Lockwire remaining three nuts as a group.	
33	III-3	Combustion Chamber Liner to Combustion Chamber Housing Attaching Nuts	375 pound-inches	400 pound-inches
34	III-3	Deflector and Seal Housing to Bearing Housing Attaching Bolts	725 pound-inches	775 pound-inches
35	III-3	First Stage Bearing Retaining Spanner Nut	3200 pound-feet	3500 pound-feet
36	III-3	Bearing Housing to First Stage Gas Producer Nozzle Bolt	1200 pound-inches	1325 pound-inches
36A	III-3	Second Stage Gas Producer Cylinder and First Stage Gas Producer Nozzle Bolts	375 pound-inches	400 pound-inches
37	III-3	Second Stage Gas Producer Rotor Nut	1700 pound-inches	1800 pound-inches
38	III-3	First Stage Turbine Rotor to Power Turbine Rotor and Bearing Housing Assembly Attaching Bolt	1400 pound-inches	1500 pound-inches
39	III-3	Combustion Chamber Liner to Combustion Chamber Housing Attaching Nuts	375 pound-inches	400 pound-inches
40	III-3	V-Band Coupling Nuts	2000 pound-inches. Release to 0 pound-inches. Retorque to 1425 pound-inches to 1575 pound-inches.	

Table III-3. Special Torque Values (Cont)

M. O.	FIG. NO.	DESCRIPTION	MINIMUM	MAXIMUM
11	III-3	Oil Strainer Housing Adapter	80 pound-inches	90 pound-inches
	III-3	Power Turbine Tubes	1000 pound-inches	1100 pound-inches
	III-3	Bearing Housing to Exhaust Diffuser Attaching Screws	20 pound-inches	30 pound-inches
44	III-3	Rear Bearing Housing to Power Turbine Rotor Spanner Nut	2225 pound-feet	2250 pound-feet
	III-3	Power Shaft Bolt	Apply Ease-Off 990 or Molykote anti-seize thread compound to threads of bolt. Tighten bolt to 1925 to 2000 pound-inches torque.	
	III-3	Exhaust Diffuser Cover Retaining Bolt	70 pound-inches	75 pound-inches
	III-3	Combustor Turbine Internal Wrenching Nut	Apply Ease-Off 990 or Molykote anti-seize thread compound to threads of nut. Tighten nut to 1000 pound-feet torque. Loosen and remove nut. Retighten power shaft bolt (5, figure 3-29) to 1925 to 2000 pound-inches torque. Install internal wrenching nut (6) and tighten to 50 pound-feet torque.	

Table 13-2. Special Torque Values (Cont)

FIG. NO.	DESCRIPTION	MINIMUM	MAXIMUM
13-3	Power Turbine Rotor Housing Cover Bolts	70 pound-inches	75 pound-inches
13-3	Power Turbine Oil Tube Connector	80 pound-inches	90 pound-inches
13-3	First Stage Gas Producer Rotor to Compressor Rotor Stub Shaft Spanner Nut	300 pound-feet	350 pound-feet
13-3	Sealing Ring, Seal and Retainer, and Retaining Plate to Bearing Housing Assembly Attaching Bolts	Tighten bolts (38, figure 3-28) to 85 to 95 pound-inches torque. Retighten bolts (38) to 40 to 45 pound-inches torque. After 5 minutes, release torque on bolts (38) and retighten to 95 to 105 pound-inches torque.	
13-3	Bearing Housing to First Stage Gas Producer Nozzle Studs (6-1100-221-00) or Support Studs (6-1100-1111-00)	70 pound-inches	80 pound-inches
13-3	Support Plate to First Stage Gas Producer Nozzle Nuts	60 pound-inches	80 pound-inches
13-3	Support Plate to First Stage Gas Producer Nozzle Attaching Nuts	60 pound-inches	80 pound-inches
13-3	Retainer to Bearing Retainer Plate Attaching Bolts	40 pound-inches	45 pound-inches
13-3	Tachometer Drive and Idlegear and Liner Assembly Spanner Nut	900 pound-inches	1000 pound-inches
13-3	Overspeed Governor and Tachometer Drive Filter	77 pound-inches	85 pound-inches
13-3	Relief Valve Assembly Nut	70 pound-inches	80 pound-inches
13-3	Overspeed Governor and Tachometer Drive Relief Valve Assembly	900 pound-inches	1000 pound-inches
13-3	Tachometer Drive and Idlegear and Liner Assembly Bolts	30 pound-inches	35 pound-inches
13-3	Upper Drive Idlegear and Liner Assembly Spanner Nut	900 pound-inches	1000 pound-inches
13-3	Upper Drive Idlegear and Liner Assembly Bolts	30 pound-inches	35 pound-inches
13-3	Accessory Drive Gearbox Cover Spanner Nut	450 pound-inches	500 pound-inches
13-3	Accessory Drive Gearshaft Liner and Gearshaft Retaining Nut	300 pound-inches	350 pound-inches
13-3	Bearing and Liner Assembly Screws	30 pound-inches	35 pound-inches
13-3	Overspeed Governor and Tachometer Drive Assembly Bearing and Liner Assembly Nut	900 pound-inches	1000 pound-inches

Table 11-3. Special Torque Values (Cont)

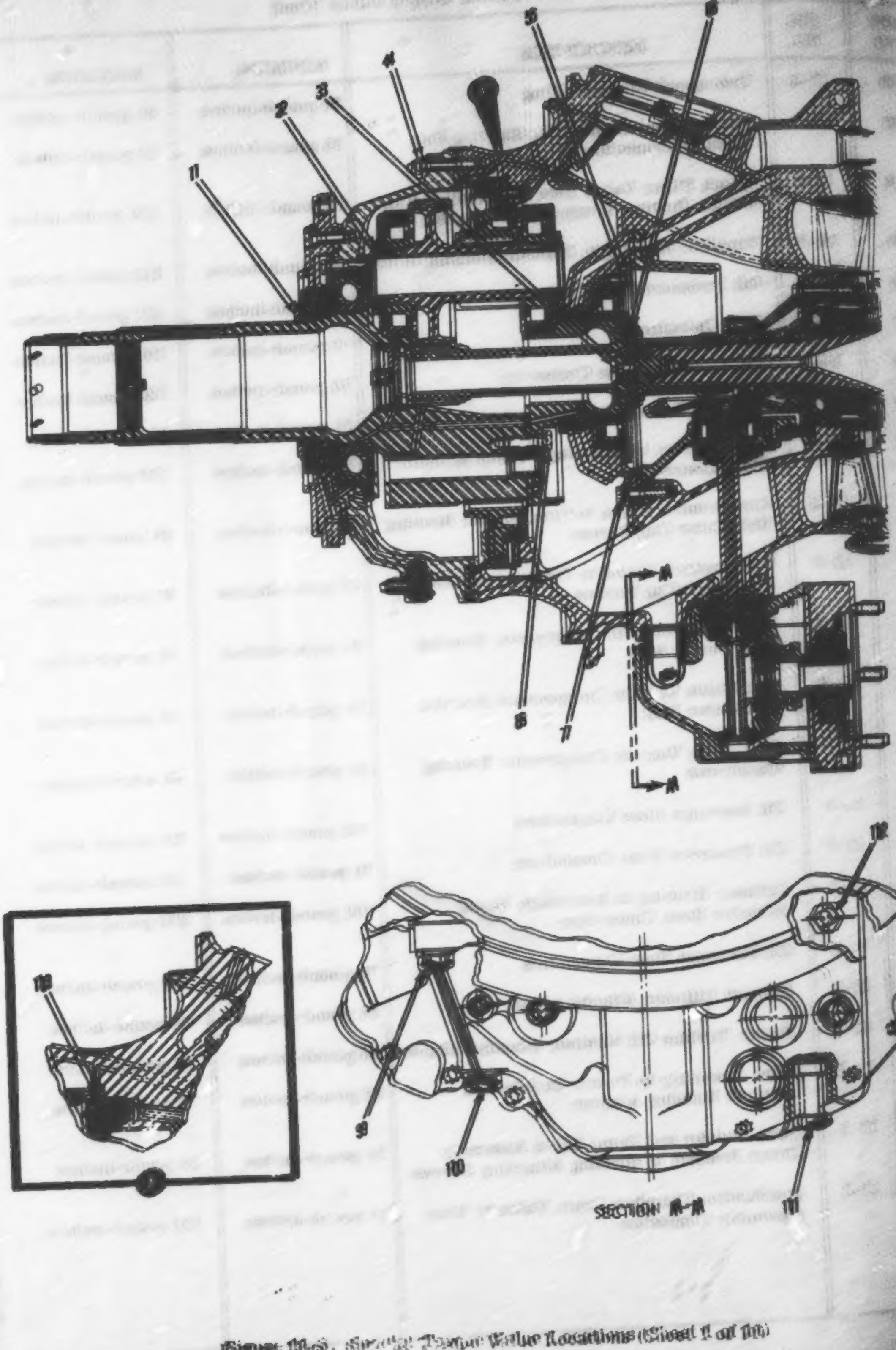
REF. NO.	FIG. NO.	DESCRIPTION	MINIMUM	MAXIMUM
65	11-3	Bearing and Liner Assembly Screws	300 pound-inches	330 pound-inches
66	11-3	Cover to Housing Bolt	330 pound-inches	400 pound-inches
67	11-3	Bearing and Liner Assembly Nut	800 pound-inches	1000 pound-inches
68	11-3	Temperature-Sensing Element Housing Attaching Bolts	188 pound-inches	222 pound-inches
69	11-3	Main Fuel Filter Assembly Securing Bolt	500 pound-inches	500 pound-inches
70	11-3	Main Fuel Manifolds to Fuel Vaporizers Connector Nuts	3600 pound-inches	4000 pound-inches
71	11-3	Retainer, Guide, and Strainer to Starting Fuel Nozzle Body Subassembly	800 pound-inches	1000 pound-inches
72	11-3	Cover and Pump Discharge Strainer Attaching Screws	300 pound-inches	600 pound-inches
73	11-3	Lube Oil Filter Cover to Filter Housing Attaching Bolt	200 pound-inches	365 pound-inches
74	11-3	Fuel Control Trimmer Lock Bolt	225 pound-inches	300 pound-inches
75	11-3	Power-Driven Rotary (Oil) Pump Adjusting Screw Locknut	8 pound-feet	10 pound-feet
76	11-3	Overspeed Governor Plug	700 pound-inches	885 pound-inches
77	11-3	Power-Driven Rotary (Booster) Pump Adjusting Screw Locknut	700 pound-inches	800 pound-inches
78	11-3	Oil Strainer Housing Connector Nut	500 pound-inches	775 pound-inches
79	11-3	Power Turbine Oil Strainer	800 pound-inches	900 pound-inches
80	11-3	No. 3 and 4 Bearings Pressure Oil Hose Nut	500 pound-inches	775 pound-inches
81	11-3	Chip Detector	900 pound-inches	1000 pound-inches
81A	11-3	Rear Bearing Housing Oil Strainer	800 pound-inches	1000 pound-inches
82	11-3	Spark Splitter Coil to Igniter Plug	400 pound-inches	500 pound-inches
83	11-3	Igniter Plug	885 pound-inches	995 pound-inches
84	11-3	Setscrew to Inlet Housing Oil Supply Nozzle	300 pound-inches	500 pound-inches
85	11-3	Setscrew to Inlet Housing Oil Supply Nozzle	300 pound-inches	500 pound-inches
86	11-3	Fuel Control Air Pressure-Sensing Hose Connector	700 pound-inches	1200 pound-inches
87	11-3	Ignition Lead to Igniter Plug	400 pound-inches	500 pound-inches
88	11-3	Igniter Plug	775 pound-inches	885 pound-inches
89	11-3	Fuel Inlet Strainer Attaching Screws	300 pound-inches	365 pound-inches
89A	11-3	Fuel Control N1 Drive Seal Retaining Screw	250 pound-inches	300 pound-inches

Table 11-3. Special Torque Values (Cont)

NO.	FIG. NO.	DESCRIPTION	MINIMUM	MAXIMUM
	11-3	Fuel Control Acceleration Bleed Band Adjustment Screw Locknut	30 pound-inches	40 pound-inches
C	11-3	Fuel Control Acceleration Bleed Band Adjustment Lockscrew	20 pound-inches	30 pound-inches
	11-3	Fuel Control Mounting Nuts	125 pound-inches	140 pound-inches
11	11-3	Fuel Control Trimmer Lock Bolt	25 pound-inches	30 pound-inches

Table 11-3. Special Torque Values (Cont)

FIG. NO.	DESCRIPTION	MINIMUM	MAXIMUM
11-3	Overspeed Governor Plug	70 pound-inches	85 pound-inches
11-3	Starting Fuel Manifold to Starting Fuel Nozzles Connector	35 pound-inches	50 pound-inches
11-3	Check Filter Valve Tube Assembly to Combustor Turbine Housing Attaching Bolts	90 pound-inches	120 pound-inches
11-3	Impeller Housing to Diffuser Housing Bolts	90 pound-inches	100 pound-inches
11-3	Oil Pressure Hose Connector	70 pound-inches	120 pound-inches
11-3	Chip Detector	90 pound-inches	100 pound-inches
11-3	Oil Pressure Hose Connector	70 pound-inches	120 pound-inches
11-3	Inlet Guide Vane Actuator Attaching Screw	30 pound-inches	35 pound-inches
11-3	Fuel Control to Interstage Bleed Actuator Hose Connection	70 pound-inches	120 pound-inches
11-3	Compressor Vanes to Compressor Housing Half Outer Cap Screws	14 pound-inches	16 pound-inches
11-3	Compressor Vanes to Compressor Housing Half Inner Cap Screws	44 pound-inches	46 pound-inches
11-3	Exit Guide Vane to Compressor Housing Half Center Bolt	44 pound-inches	46 pound-inches
11-3	Exit Guide Vane to Compressor Housing Half Outer Bolt	14 pound-inches	16 pound-inches
11-3	Exit Guide Vane to Compressor Housing Capscrews	30 pound-inches	40 pound-inches
11-3	Oil Scavenge Hose Connectors	100 pound-inches	250 pound-inches
11-3	Oil Pressure Hose Connectors	70 pound-inches	120 pound-inches
11-3	Diffuser Housing to Interstage Bleed Actuator Hose Connection	100 pound-inches	250 pound-inches
11-3	Oil Scavenge Hose Connectors	70 pound-inches	120 pound-inches
11-3	Exhaust Diffuser Attaching Nuts	35 pound-inches	45 pound-inches
11-3	Power Turbine Oil Strainer Housing Adapter	80 pound-inches	90 pound-inches
11-3	Hose Assembly to Power Turbine Oil Strainer Housing Adapter	50 pound-inches	75 pound-inches
11-3	Flow Divider and Dump Valve Assembly Cover Bracket to Housing Attaching Screws	35 pound-inches	36 pound-inches
11-3	Combustion Chamber Drain Valve to Hose Assembly Connector	70 pound-inches	120 pound-inches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SECTION A-A

Figure 11-5. Special Torque Value Locations (Sheet 1 of 10)

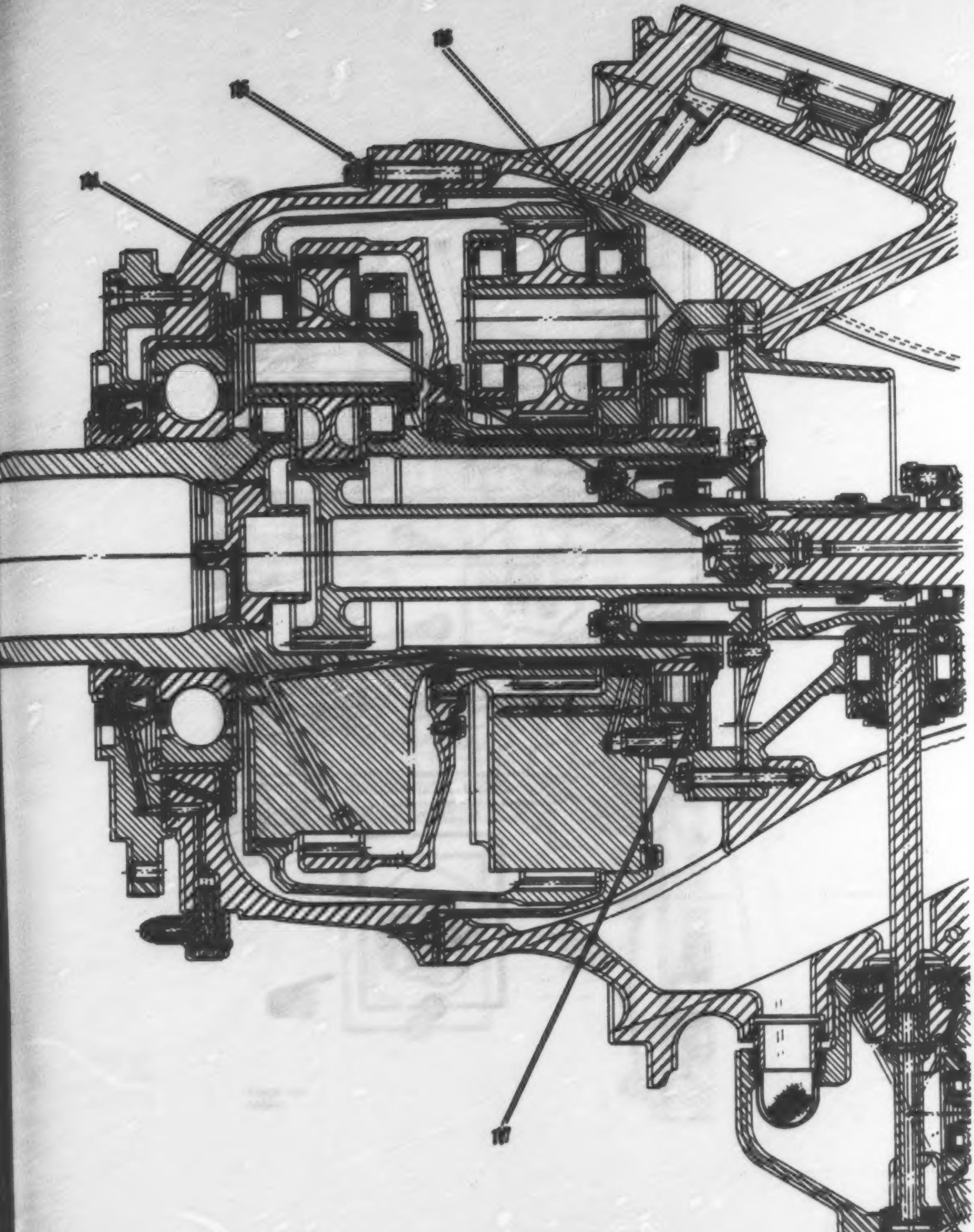

Figure 11-3. Special Torque Value Locations (Sheet 2 of 10)

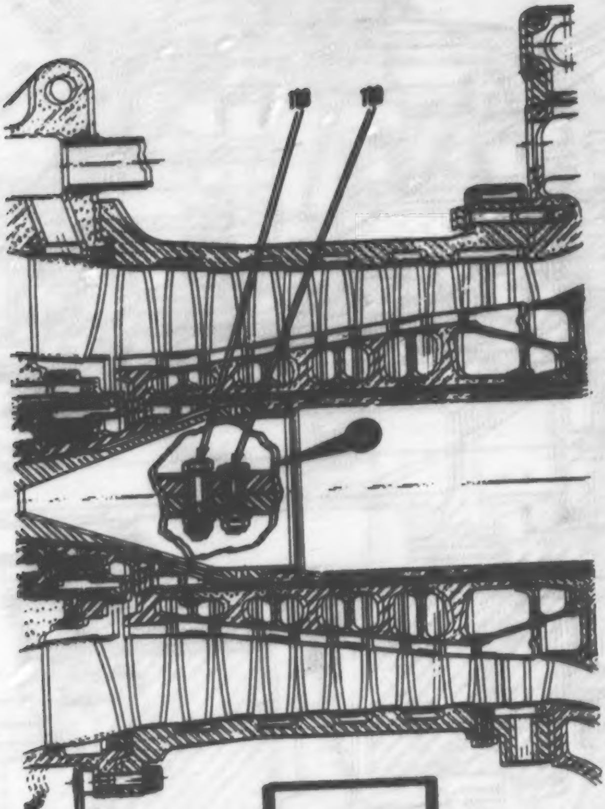

Figure 11-5. Special Torque Value Locations (Sheet 3 of 10)

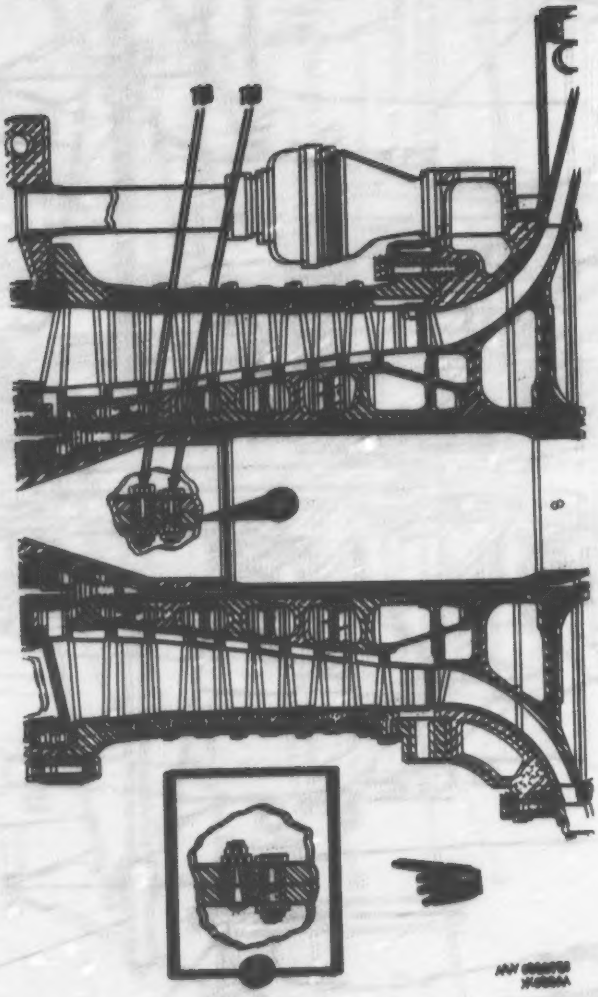

Figure 11-8. Special Torque Value Locations (Sheet 4 of 10)

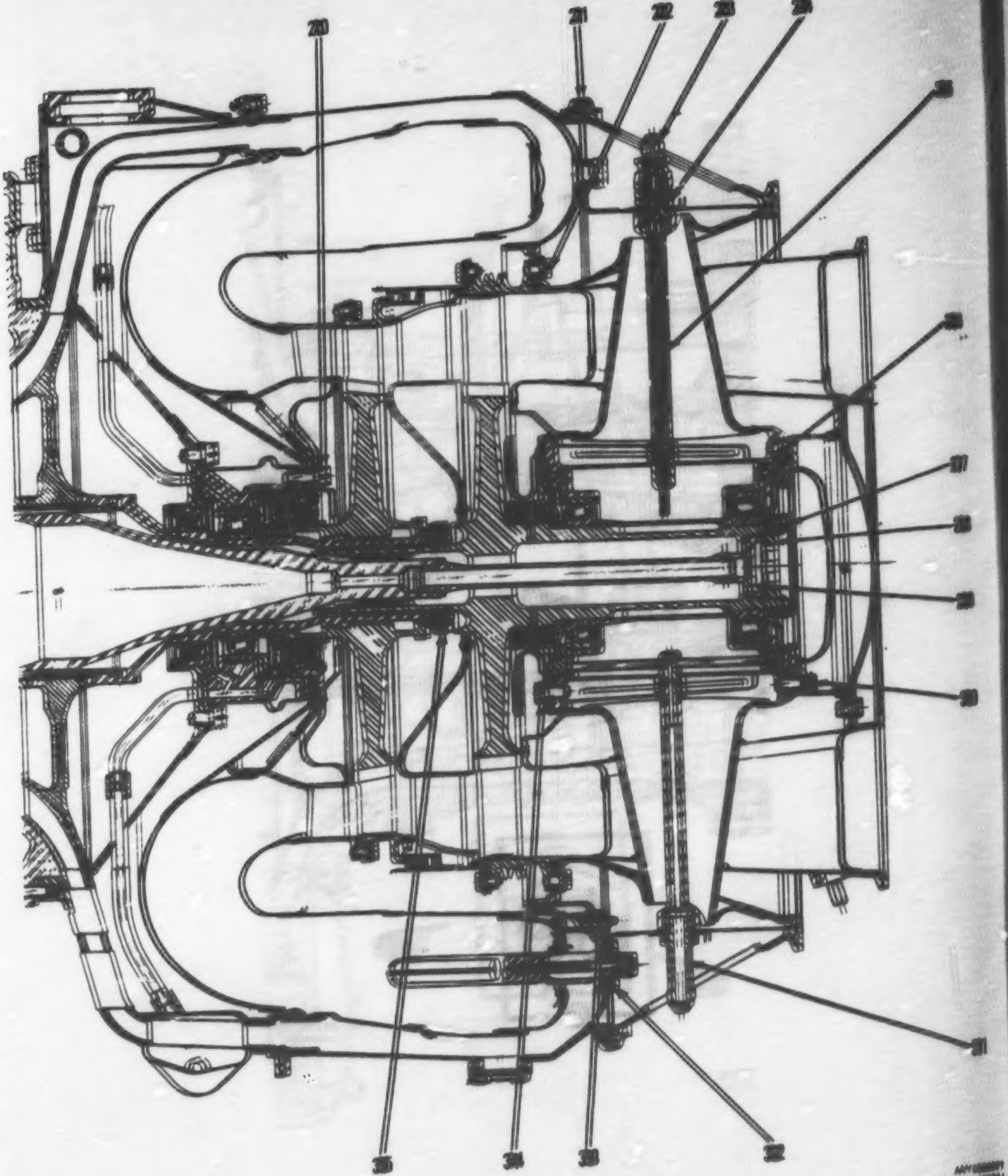
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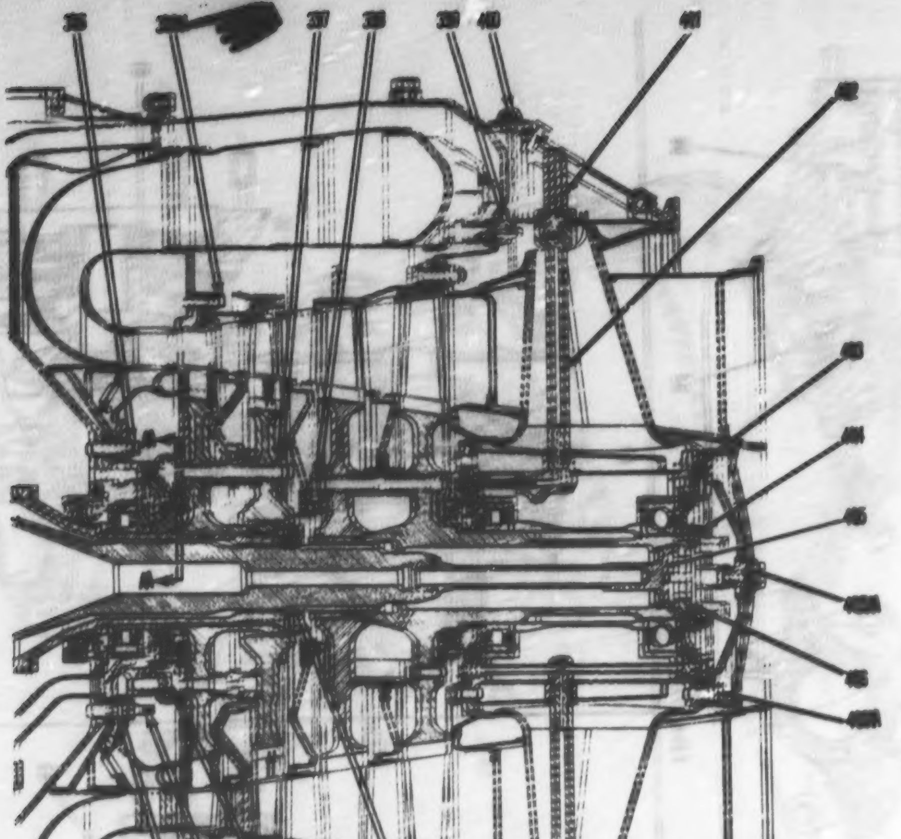
Figure 11-3. Special Torque Value Locations (Sheet 5 of 11)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SECTION A-A

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Figure 11-3. Special Torque Value Locations (Sheet 6 of 11)

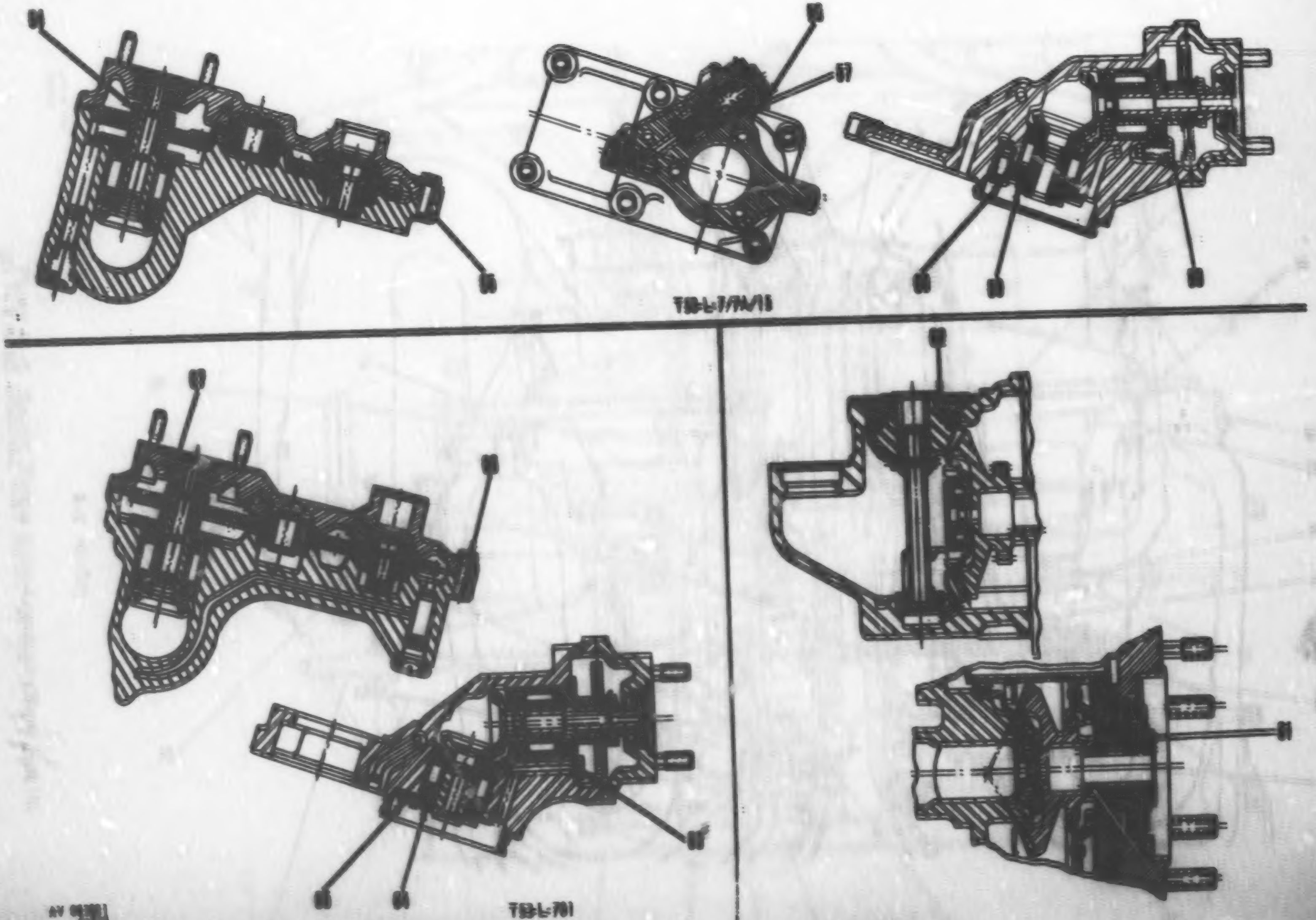
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Figure 11-8: Special Torque Value Locations (Sheet 7 of 13)

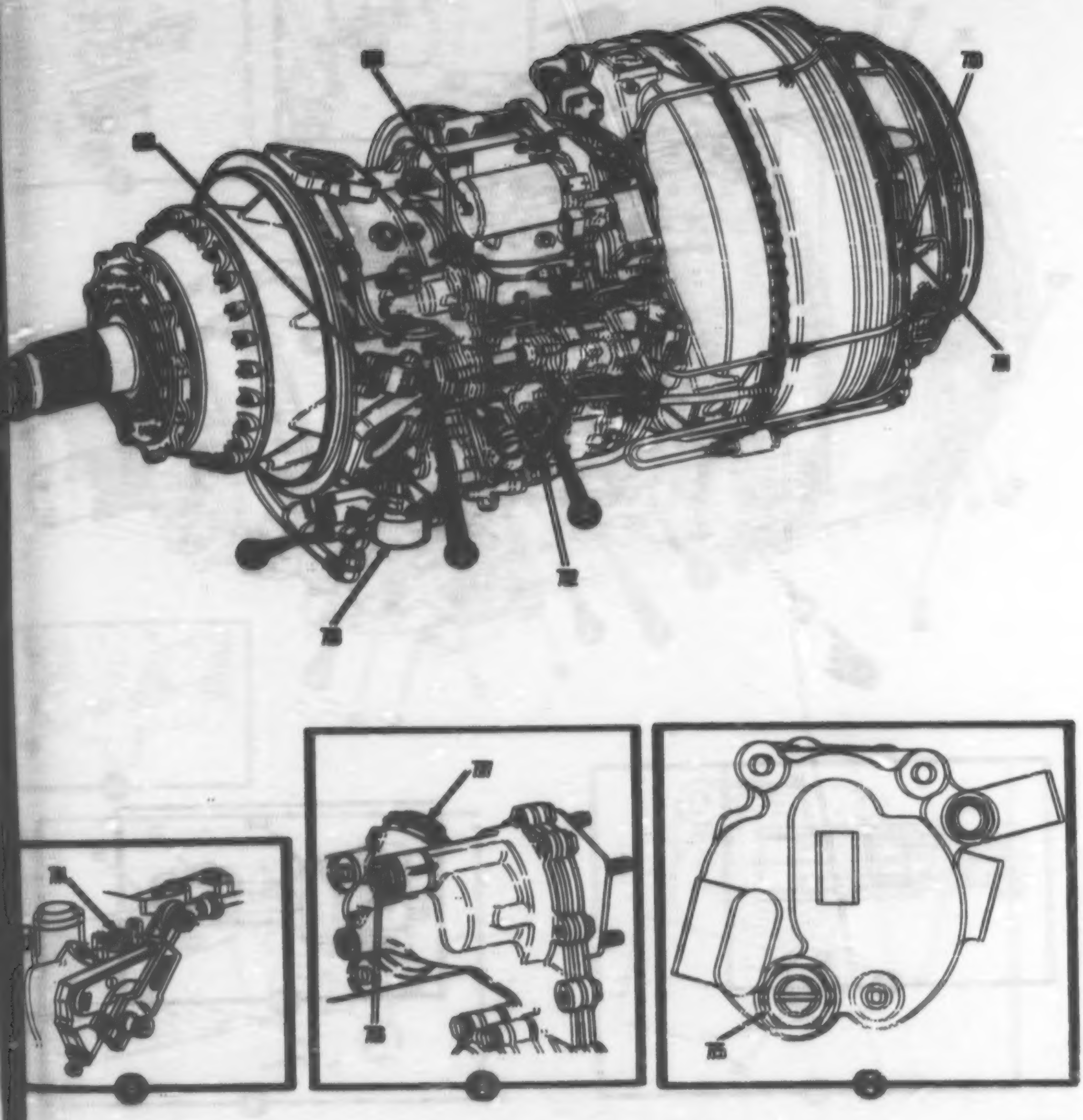

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Figure 11-8 [illegible]

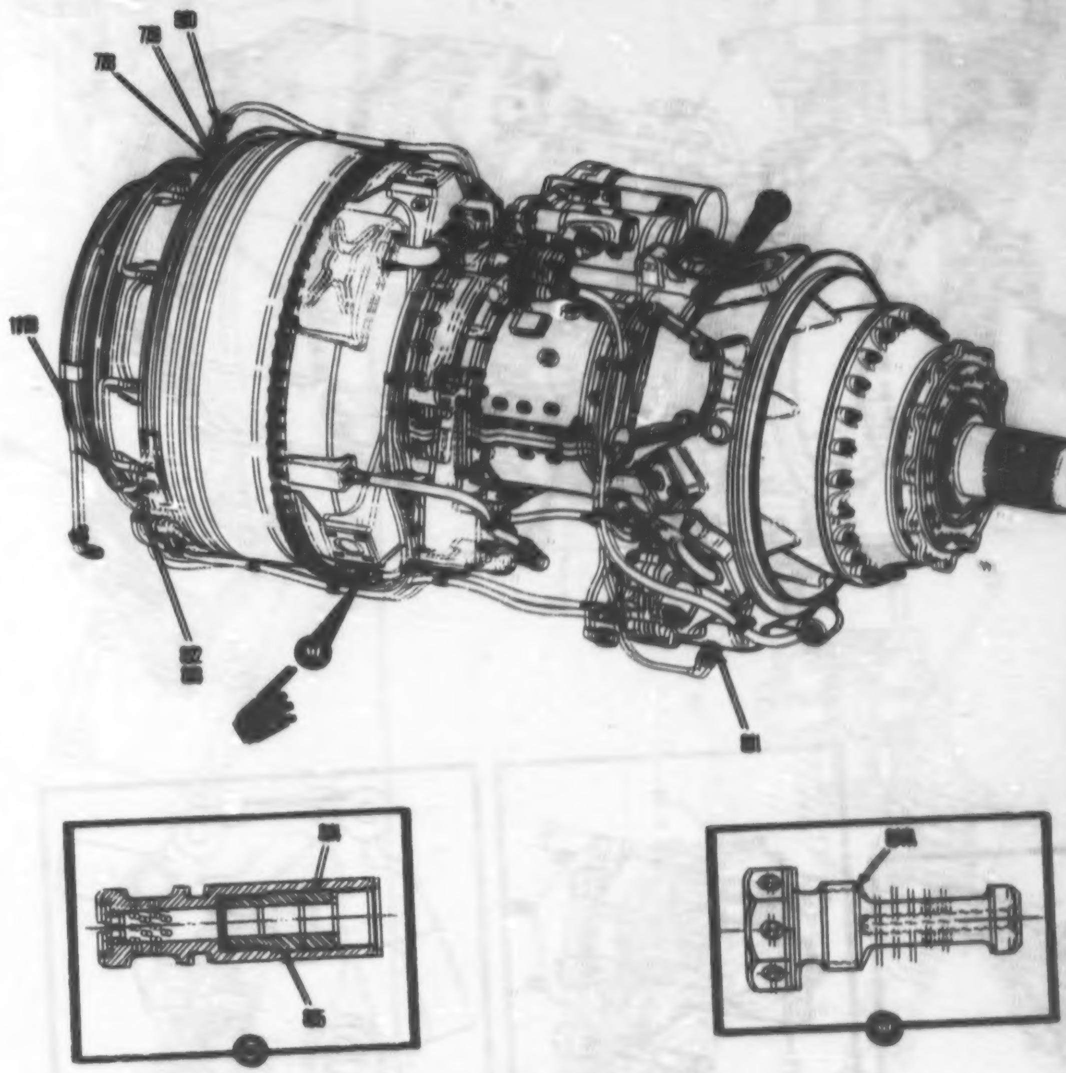
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Figure 11-3. Special Torque Value Locations (Sheet 9 of 11)

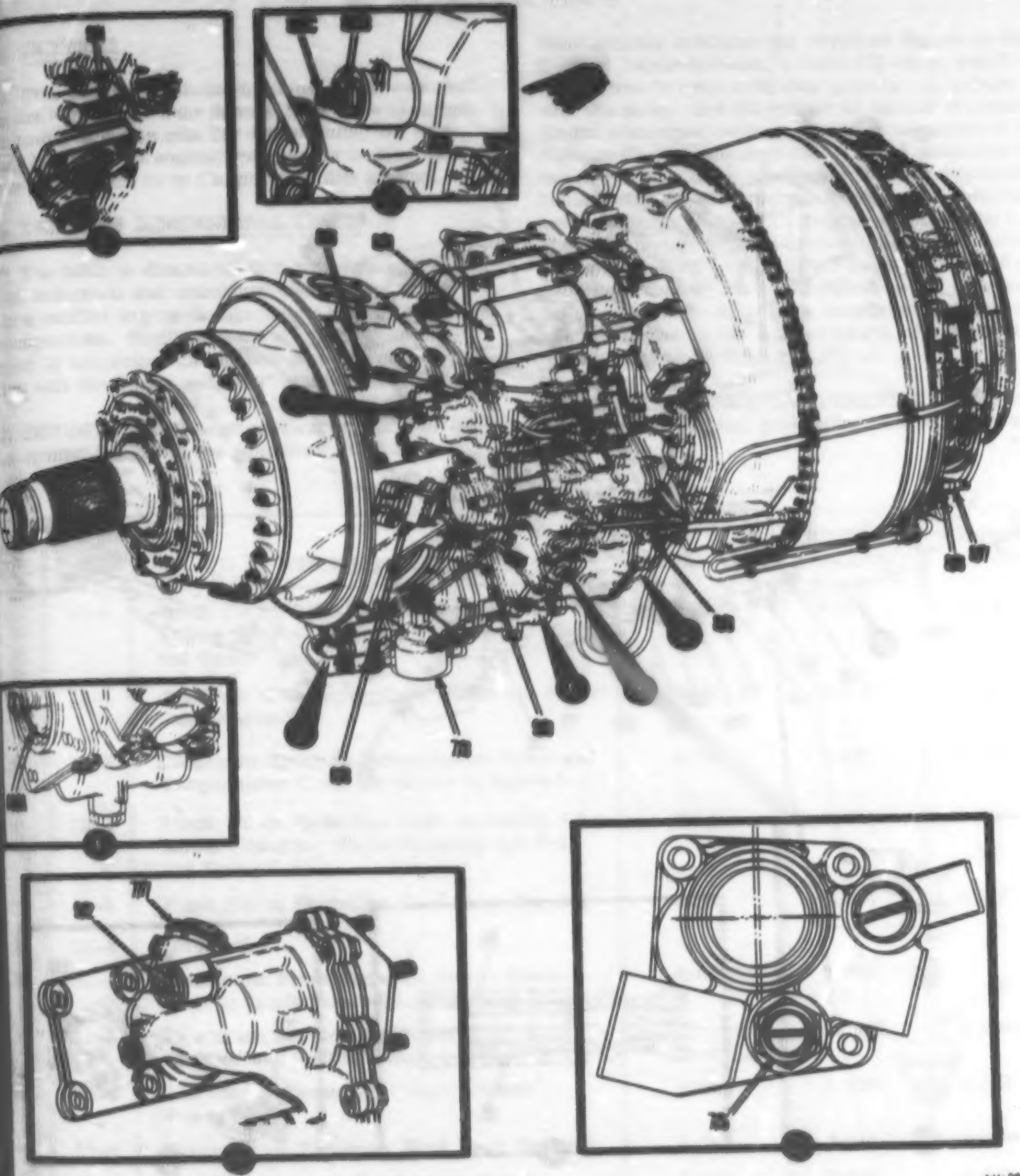

Figure 11-3. Special Torque Value Locations (Sheet 10 of 11)

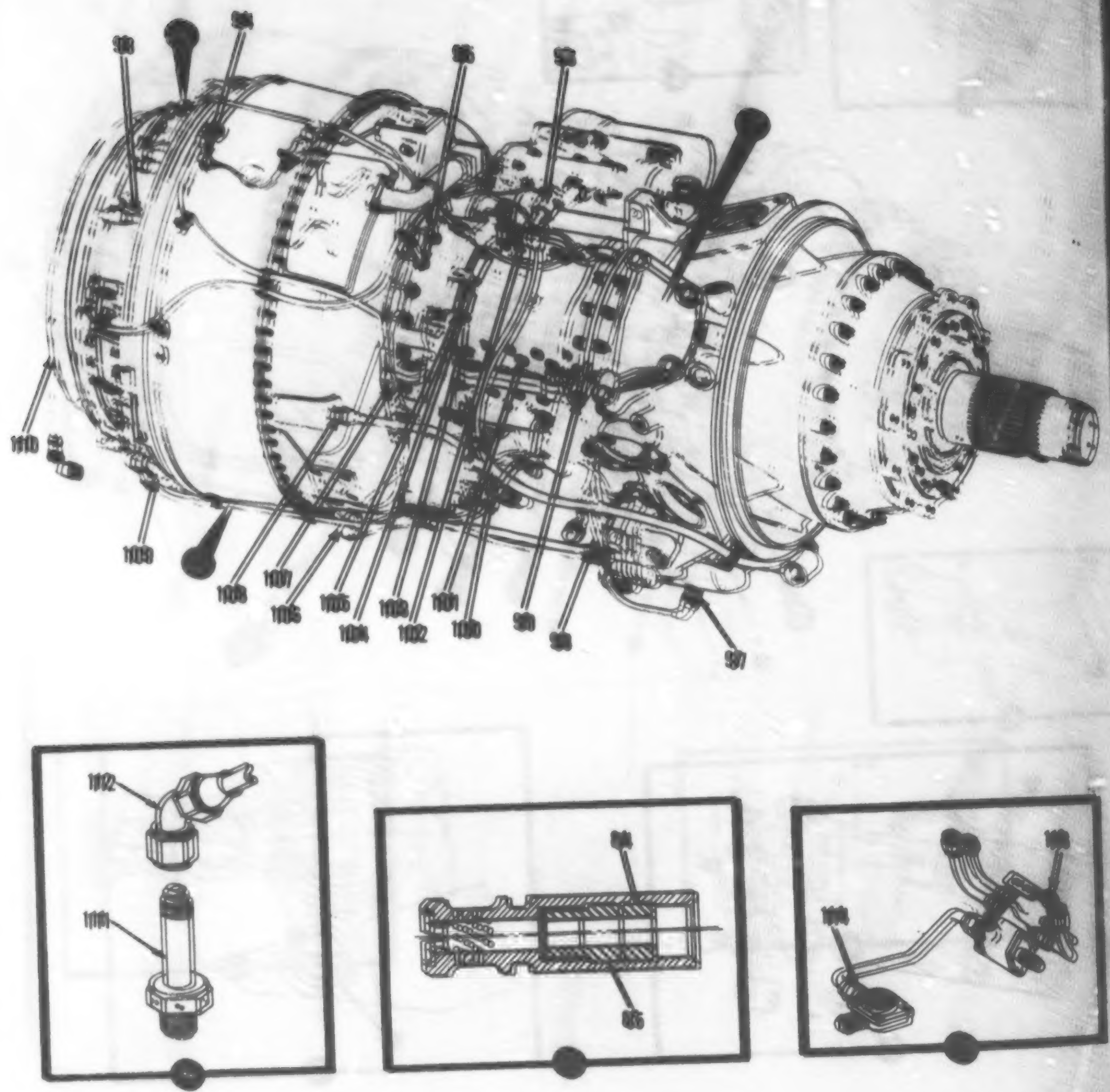
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Figure 11-3. Special Torque Value Locations (Sheet 11 of 11)

SECTION III

DIMENSIONAL LIMITS

4. GENERAL.

5. This section contains the table of dimensional
s and their reference figure. The table of dimen-
al limits is applicable for determining the rela-
ship between two engine components and/or assem-
s referenced to in Chapters of this manual.

6. TABLE OF DIMENSIONAL LIMITS.

7. The table of dimensional limits (table 11-4)
s the minimum and maximum clearances which
the specified engine design limits using new en-
components. Replacements of part(s) shall be
ned by inspection and repair criteria in con-
ion with the limits specified in table 11-4.

8. DEFINITIONS. Where applicable, an alpha-
al symbol following the specified value in the limit column indicates the required degree of fit: D-drag, I-interference, L-loose, S-snug, and T-tight; TIR refers to total indicator reading; ID refers to inside diameter; and OD refers to outside diameter. Radial clearance between parts is measured at a right angle to a common axis. Axial clearance between parts is given where the location requires a combination of clearances. Diametrical clearance between parts pertains to measurement along a given diameter; circumferential clearance pertains to the periphery or perimeter measurement of a common circular area. Backlash is the clearance between parts to determine looseness or wear of parts. Runout is the measurement of maximum diametrical eccentricity of a part.

11-19. REFERENCE ILLUSTRATIONS. The various fits, clearances, and backlashes are shown in figure 11-4.

Table 11-4. Dimensional Limits

R. NO.	FIG. NO.	DESCRIPTION	DIRECTION MEASURED	MINIMUM (INCHES)	MAXIMUM (INCHES)
1	11-4	Pinch Fit on Reduction Gear Assembly Thrust Bearing (Refer to paragraph 8-61 and figure 8-34.)	Axial	0.004	0.006
2	11-4	End Play of Reduction Gear Assembly Planet Gear Assembly	Axial	0.012	0.038
3	11-4	Clearance Between Torquemeter Valve and Torquemeter Cylinder (Refer to figure 9-6.)	Axial	0.026	0.030
4	11-4	Pinch Fit on Reduction Gear Assembly Rear Support Bearing (Refer to paragraph 8-61 and figure 8-35.)	Axial	0.006	0.008
5	11-4	Pinch Fit on Propeller Shaft Rear Bearing	Axial	0.004	0.006
6	11-4	(Deleted)			
7	11-4	Dimension From Forward End of Power Shaft to Inside Rear of Locking Cup	Axial	2.400	
8	11-4	Clearance Between Propeller Shaft Rear Carrier and Sealing Rings	Circumferential	0.0015	0.0045
8A	11-4	End Play Between Sun Gearshaft and Power Shaft	Axial	0.020	0.047
9	11-4	Pinch Fit on Propeller Shaft Rear Bearing	Axial	0.003	0.006
9A	11-4	End Play Between Sun Gearshaft and Power Shaft	Axial	0.020	0.047
10	11-4	(Deleted)			
10A	11-4	Dimension From Forward End of Power Shaft to Inner Flange of Spur Gear	Axial	2.020	2.040
11	11-4	Tip Clearance Between First Stage Compressor Rotor Blade and Compressor Housing Assembly	Radial	0.021	

Table 11-4. Dimensional Limits (Cont)

REF. NO.	FIG. NO.	DESCRIPTION	DIRECTION MEASURED	MINIMUM (INCHES)	MAXIMUM (INCHES)
12	11-4	Clearance Between First through Fourth Stage Vane Assemblies and Exit Guide Vane ID to Compressor Rotor Spacer OD	Radial	0.026	0.034
13	11-4	(Deleted)			
14	11-4	Tip Clearance Between Second and Third Stage Compressor Rotor Blades and Compressor Housing Assembly	Radial	0.004	
15	11-4	Tip Clearance Between Fourth and Fifth Stage Compressor Rotor Blades and Compressor Housing Assembly	Radial	0.023	
16	11-4	Fit Between Interstage Bleed Band Assembly and Compressor Housing Assembly	Radial	0.0020	0.0057
17	11-4	Clearance Between Centrifugal Compressor Impeller Assembly (Forward End of Impeller Blade) and Impeller Housing Assembly	Radial	0.017	
18	11-4	Clearance Between Centrifugal Compressor Impeller Assembly (Midpoint of Impeller Blade) and Impeller Housing Assembly	Axial/ Radial	0.017	
19	11-4	Clearance Between Centrifugal Compressor Impeller Assembly (Rear End of Impeller Blade) and Impeller Housing Assembly	Axial	0.026"	
20	11-4	Tip Clearance Between Centrifugal Compressor Impeller Blades and Diffuser Housing	Radial	0.026	0.06
21	11-4	(Deleted)			
22	11-4	Clearance Between Exit Guide Vane Assembly and Centrifugal Compressor Impeller	Axial	0.012	0.05
23	11-4	Clearance Between Exit Guide Vane Assembly and Impeller Housing Assembly	Axial	0.030	0.06
24	11-4	Clearance Between Fifth Stage Compressor Rotor Disc Assembly and Exit Guide Vane Assembly	Axial	0.045	
25	11-4	Clearance Between Fourth Stage Compressor Vane Assembly and Fifth Stage Compressor Rotor Disc Assembly	Axial	0.044	
26	11-4	Clearance Between Fourth Stage Compressor Rotor Disc Assembly and Fourth Stage Compressor Vane Assembly	Axial	0.042	

Table 11-4. Dimensional Limits (Cont)

REF. NO.	FIG. NO.	DESCRIPTION	DIRECTION MEASURED	MINIMUM (INCHES)	MAXIMUM (INCHES)
27	11-4	Clearance Between Third Stage Compressor Vane Assembly and Fourth Stage Compressor Rotor Disc Assembly	Axial	0.046	
28	11-4	Clearance Between Third Stage Compressor Rotor Disc Assembly and Third Stage Compressor Vane Assembly	Axial	0.040	
29	11-4	Clearance Between Second Stage Compressor Vane Assembly and Third Stage Compressor Rotor Assembly	Axial	0.040	
30	11-4	Clearance Between Second Stage Compressor Rotor Disc Assembly and Second Stage Compressor Vane Assembly	Axial	0.057	
31	11-4	Clearance Between First Stage Compressor Vane Assembly and Second Stage Compressor Rotor Disc Assembly	Axial	0.038	
32	11-4	Clearance Between First Stage Compressor Rotor Disc Assembly and First Stage Compressor Rotor Vane Assembly	Axial	0.038	
33	11-4	Clearance Between Air Inlet Vane and First Stage Compressor Rotor Assembly	Axial	0.084	0.156
34	11-4	Tip Clearance Between First Stage Compressor Rotor Blade and Compressor Housing Assembly	Radial	0.028	
35	11-4	Clearance Between First through Fourth Stage Vane Assemblies and Exit Guide Vane ID to Compressor Rotor Spacer OD	Radial	0.026	
36	11-4	Tip Clearance Between Second Stage Compressor Rotor Blade and Compressor Housing Assembly	Radial	0.026	
37	11-4	Tip Clearance Between Third through Fifth Stage Compressor Rotor Blades and Compressor Housing Assembly	Radial	0.025	
38	11-4	Clearance Between Centrifugal Compressor Impeller Assembly (Forward End of Impeller Blade) and Impeller Housing Assembly	Radial	0.017	
39	11-4	Clearance Between Centrifugal Compressor Impeller Assembly (Midpoint of Impeller Blade) and Impeller Housing Assembly	Axial/ Radial	0.023	
40	11-4	Clearance Between Centrifugal Compressor Impeller Assembly (Rear End of Impeller Blade) and Impeller Housing Assembly	Axial	0.040	
41	11-4	(Deleted)			
42	11-4	Clearance Between Bevel Ends of Mating Compressor Vane Assemblies		0.000	

Table 11-4. Dimensional Limits (Cont)

REF. NO.	FIG. NO.	DESCRIPTION	DIRECTION MEASURED	MINIMUM (INCHES)	MAXIMUM (INCHES)
43	11-4	Clearance Between Fifth Stage Compressor Rotor Disc Assembly and Exit Guide Vane Assembly	Axial	0.020	
44	11-4	Clearance Between Fourth Stage Compressor Vane Assembly and Fifth Stage Compressor Rotor Disc Assembly	Axial	0.010	
45	11-4	Clearance Between Fourth Stage Compressor Rotor Disc Assembly and Fourth Stage Compressor Vane Assembly	Axial	0.034	
46	11-4	Clearance Between Third Stage Compressor Vane Assembly and Fourth Stage Compressor Rotor Disc Assembly	Axial	0.039	
47	11-4	Clearance Between Third Stage Compressor Rotor Disc Assembly and Third Stage Compressor Vane Assembly	Axial	0.032	
48	11-4	Clearance Between Second Stage Compressor Vane Assembly and Third Stage Compressor Rotor Disc Assembly	Axial	0.036	
49	11-4	Clearance Between Second Stage Compressor Rotor Disc Assembly and Second Stage Compressor Vane Assembly	Axial	0.020	
50	11-4	Clearance Between First Stage Compressor Vane Assembly and Second Stage Compressor Rotor Disc Assembly	Axial	0.029	
51	11-4	Clearance Between First Stage Compressor Rotor Disc Assembly and First Stage Compressor Rotor Vane Assembly	Axial	0.033	
52	11-4	Clearance Between First Stage Turbine Rim Forward Face and First Stage Turbine Nozzle (Refer to paragraph 9-22 and figure 8-41.)	Axial	0.030	
53	11-4	Tip Clearance of First Stage Turbine Rotor	Radial	0.025	
54	11-4	Combustor Turbine Clearance (Refer to paragraph 9-21 and figure 8-41.)	Axial	0.030	0.070
55	11-4	Tip Clearance of Power Turbine Rotor	Radial	0.025	
56	11-4	Runout Just Inboard of Blade Roots and Runout on Hub of Disc Immediately Forward of Hub Lip of First Stage Turbine Rotor Assembly	Axial and Radial		0.003 TIR
57	11-4	Pinch Fit on No. 4 Bearing in Rear Bearing Housing (Refer to paragraph 8-68 and figure 8-95.)	Axial	0.003	0.005
58	11-4	(Deleted)			

Table 11-4. Dimensional Limits (Cont)

FIG. NO.	DESCRIPTION	DIRECTION MEASURED	MINIMUM (INCHES)	MAXIMUM (INCHES)
11-4	(Deleted)			
11-4	Pinch Fit on No. 3 Bearing Outer Race	Axial	0.003	0.010
11-4	Clearance Between Second Stage Nozzle Inner Shroud and Second Stage Turbine Blade Root (See figure 8-41.)	Axial	0.070	
11-4	Clearance Between Aft Face of Retaining Nut and Aft Face of Compressor Rotor Rear Stub Shaft	Axial		0.030
11-4	Clearance Between OD of Power Turbine Forward Shaft and ID of Power Turbine Nozzle Air Seal	Radial	0.005	
11-4	Pinch on No. 2 Bearing Outer Race	Axial	0.000	0.004
11-4	Clearance Between First Stage Gas Producer Nozzle Assembly and First Stage Gas Producer Turbine Rotor (Refer to paragraph 9-24 and figure 9-7.)	Axial	0.070	0.120
11-4	Face Runout of First Stage Gas Producer Turbine Rotor Assembly	Axial		0.004 TIR
11-4	Hub Runout of Second Stage Gas Producer Turbine Rotor Assembly	Radial		0.003 TIR
11-4	Rear Flange Runout on First Stage Gas Producer Turbine Rotor Assembly	Radial		0.003 TIR
11-4	Tip Clearance of Second Stage Power Turbine Rotor (Refer to paragraph 8-75.)	Radial	0.025	
11-4	Clearance Between First Stage Power Turbine Nozzle and Shrouded Tip of First Stage Power Turbine Rotor Blades (Refer to paragraph 8-74 and figure 8-44.)	Axial	[illegible]	0.078
11-4	Clearance Between First Stage Power Turbine Rotor and Second Stage Power Turbine Nozzle (Refer to paragraph 8-74 and figure 8-44.)	Axial	0.062	0.077
11-4	Face Runout of First Stage Power Turbine	Axial		0.004 TIR
11-4	Tip Clearance of First Stage Power Turbine Rotor (Refer to paragraph 8-76.)	Radial	0.025	
11-4	Pinch Fit on No. 4 Bearing in Rear Housing Housing (Refer to paragraph 8-73 and figure 8-42.)	Axial	0.003	0.005
11-4	Clearance Between Pin OD and Holes in Combustion Chamber Flange Ring and Spacers	Diametrical	0.0001L	0.0005L
11-4	Clearance Between Second Stage Power Turbine Rotor and Forward Face of Inner Diffuser Cone	Axial	0.030	
11-4	Clearance Between First Stage Power Turbine Nozzle and Sealing Flange	Radial	0.005	

Table 11-4. Dimensional Limits (Cont)

REF. NO.	FIG. NO.	DESCRIPTION	DIRECTION MEASURED	MINIMUM (INCHES)	MAXIMUM (INCHES)
76	11-4	Face Runout of Second Stage Gas Producer Turbine Rotor Assembly	Axial		0.004 TIR
77	11-4	Clearance Between Second Stage Gas Producer Cylinder and First Stage Power Turbine Nozzle (Refer to paragraph 9-25 and figure 9-14).	Axial	0.030	[illegible]
78	11-4	Tip Clearance of Second Stage Gas Producer Rotor	Radial	0.020	
79	11-4	Clearance Between Second Stage Gas Producer Nozzle and Second Stage Gas Producer Rotor (Refer to paragraph 9-25).	Axial	0.125	0.200
80	11-4	Clearance Between First Stage Gas Producer Rotor Assembly and Second Stage Gas Producer Nozzle (Refer to paragraph 9-25 and figure 9-11).	Axial	0.074	0.130
81	11-4	Tip Clearance of First Stage Gas Producer Rotor	Radial	0.020	
81A	11-4	Clearance Between Pin OD and Holes in Combustion Chamber Flange Ring and Spacers	Diametrical	0.0001L	[illegible]
82	11-4	Clearance Between Power Turbine Spacer and Second Stage Power Turbine Nozzle	Radial	0.010	
83	11-4	(Deleted)			
84	11-4	(Deleted)			
85	11-4	Topping Governor Condition Lever Spring-Back	Variable Dimensions. Refer to paragraph 5-75.		
86	11-4	Pinch Fit on Thrust Bearing Liner Bearing	Axial	0.002	[illegible]
87	11-4	Backlash on Accessory Drive Bevel Gear Assembly	Circumferential	0.005	[illegible]
88	11-4	Backlash Between Accessory Drive Gearbox Tachometer Drive Shaftgear and Upper Drive Shaftgear	Circumferential	[illegible]	[illegible]
89	11-4	Backlash Between Accessory Drive Gearbox Intermediate Gear and Each Shaftgear	Circumferential	[illegible]	[illegible]
90	11-4	Pinch Fit on Overspeed Governor and Tachometer Drive Assembly Bearing to Liner Flange	Axial	0.002	[illegible]
91	11-4	Backlash Between Overspeed Governor and Tachometer Drive Assembly Tachometer Drive Gearshaft and Lower Drive Gearshaft	Circumferential	[illegible]	[illegible]
92	11-4	Backlash Between Overspeed Governor and Tachometer Drive Assembly Intermediate Spur Gear and Spur Gearshaft	Circumferential	[illegible]	[illegible]

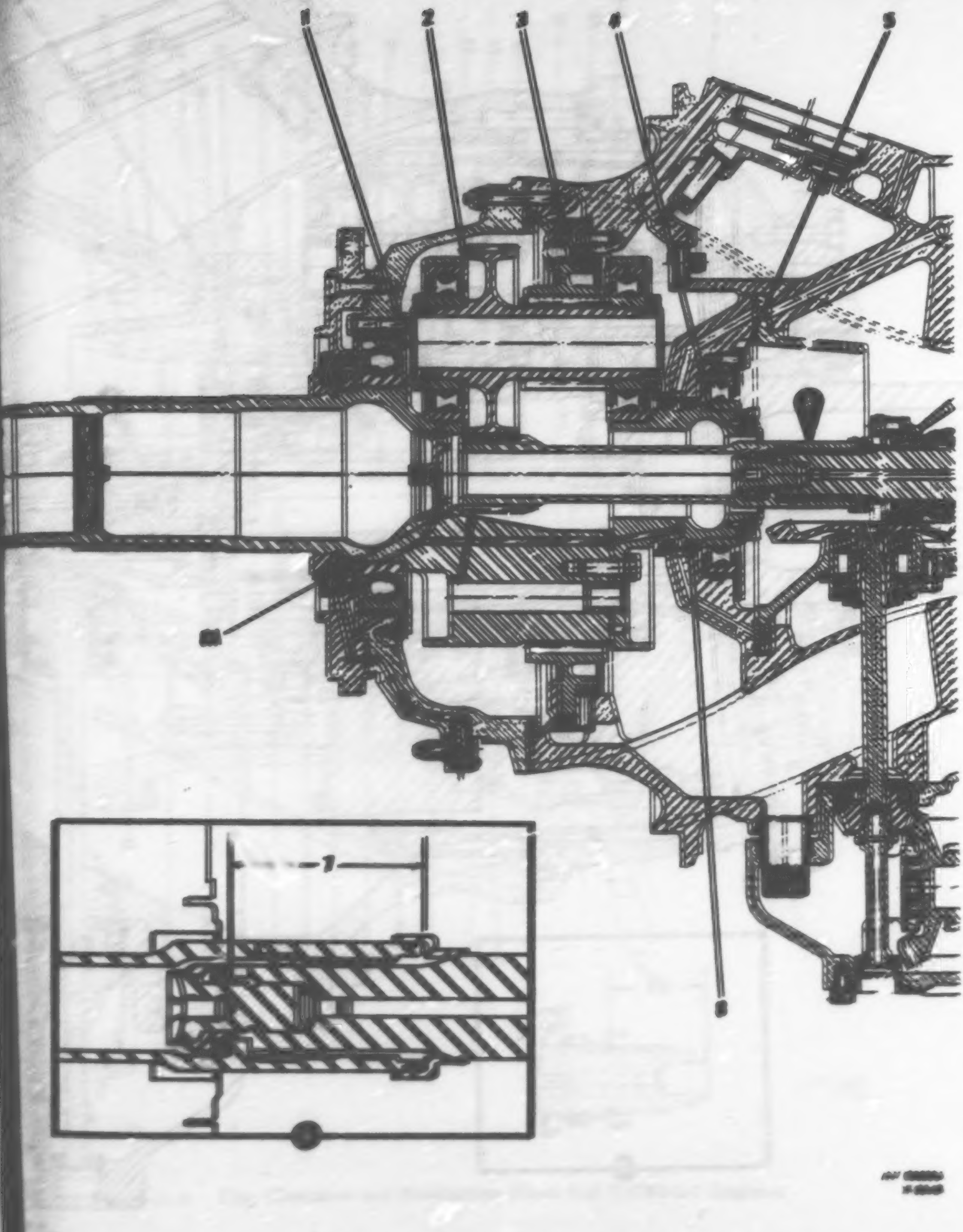

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Figure 11-4. Fits, Clearances and Backlashes (Sheet 1 of 7) (T53-L-[illegible] Engines)

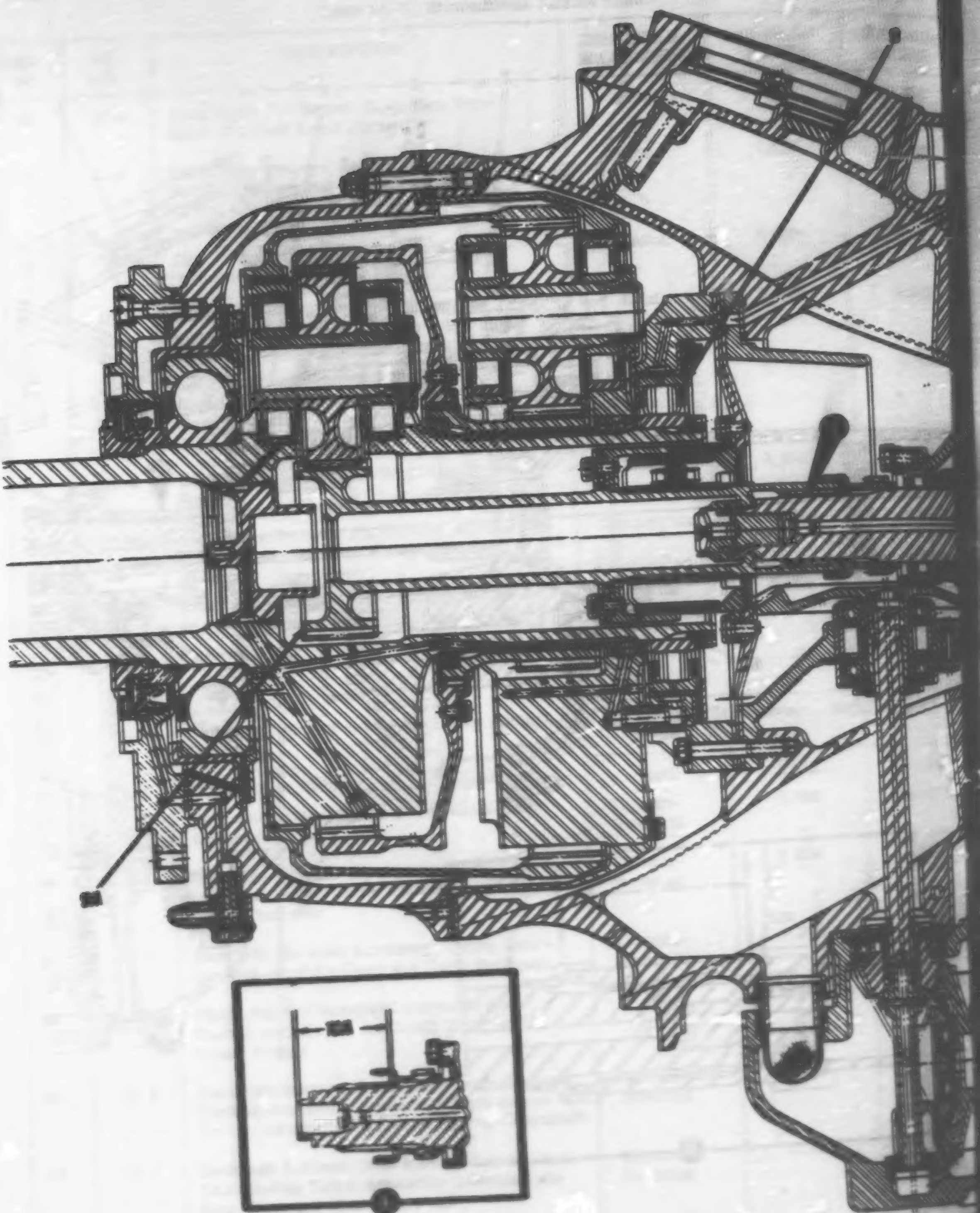

Figure 11-4. Fits, Clearances and Backlashes (Sheet 2 of 3) (T55-L-712 Engine)

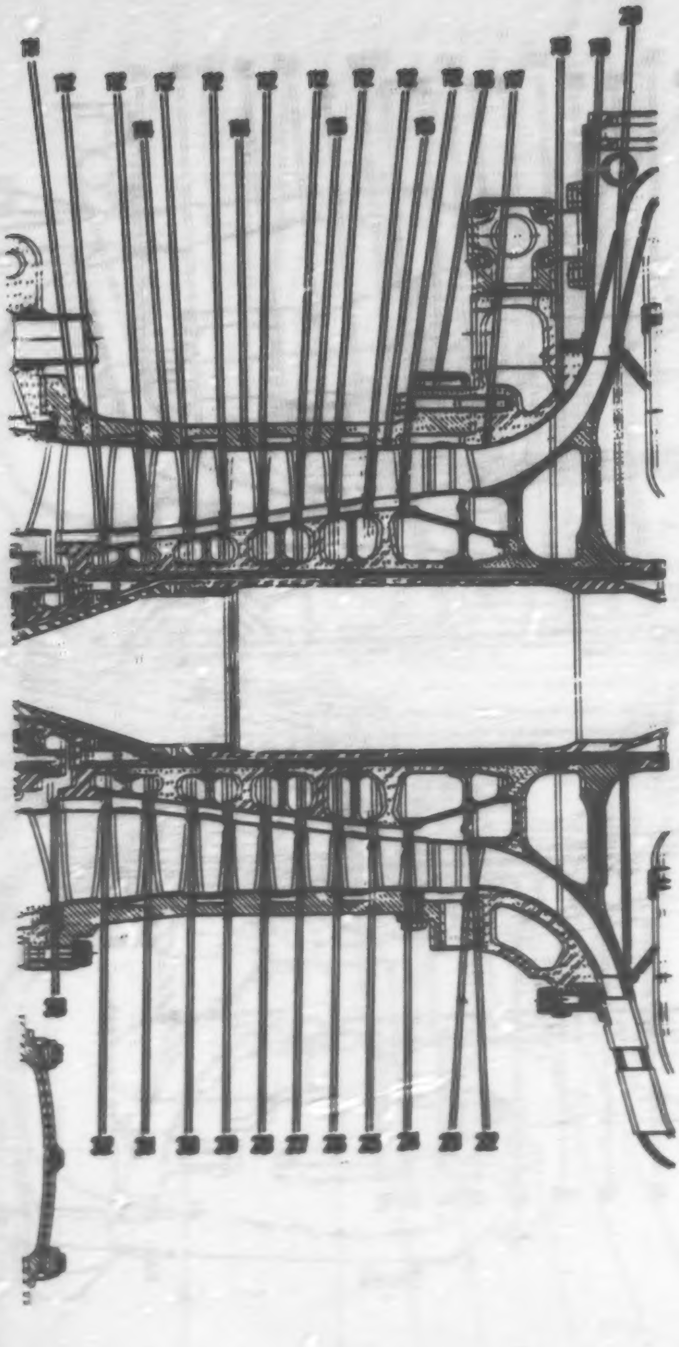
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Figure 11-4 Fits, Clearances and Backlashes (Sheet 3 of 7) (T53-L-7 Engines)

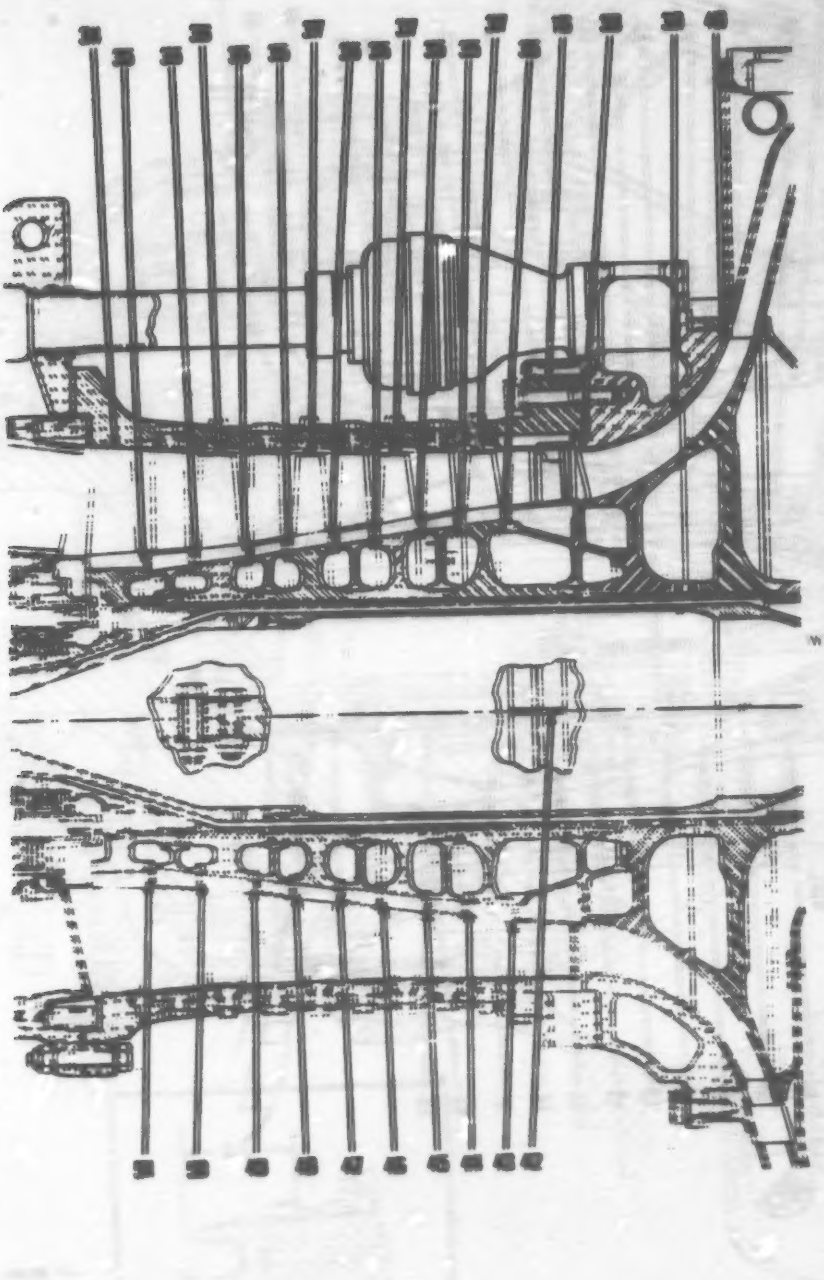
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Figure 11-4. Fits, Clearances and Backlashes (Sheet 4 of 7) (T53-L-15 and -701 Engine

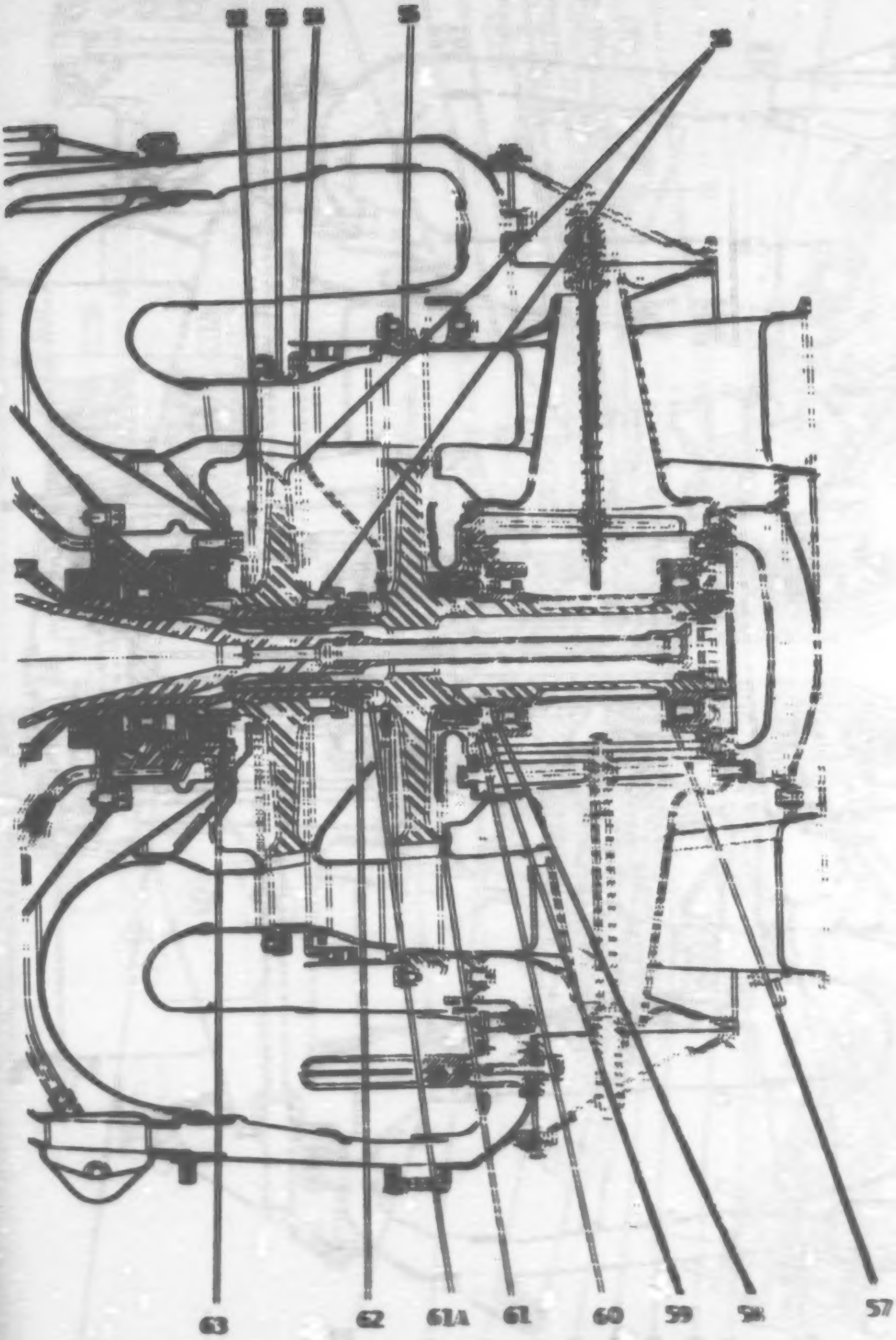
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Figure 11-4. Fits, Clearances and Backlashes (Sheet 5 of 7) (T53-L-7 Engine)

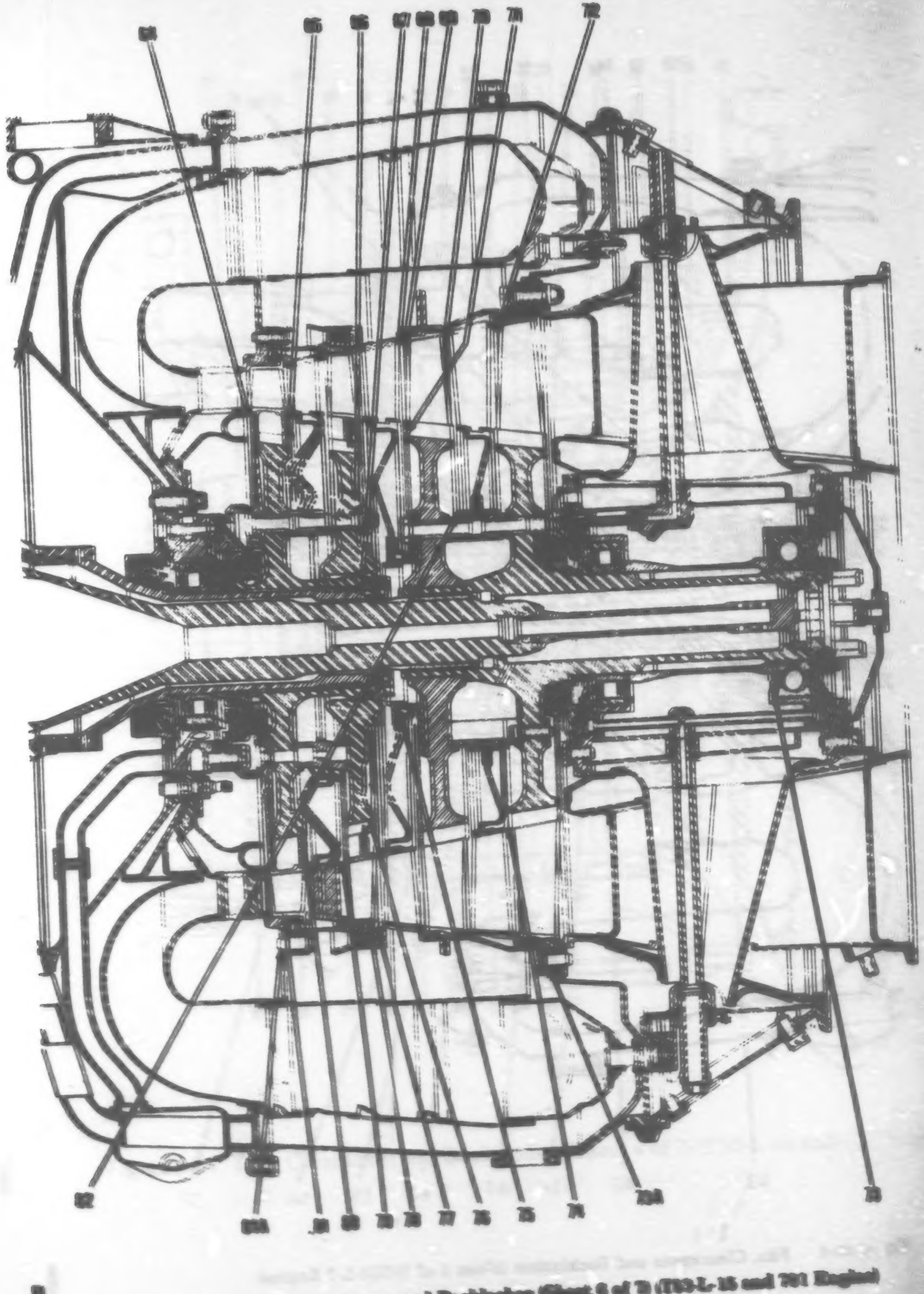
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Figure 11-4. Fits, Clearances and Backlashes (Sheet 6 of 7) (T53-L-15 and 701 Engine)

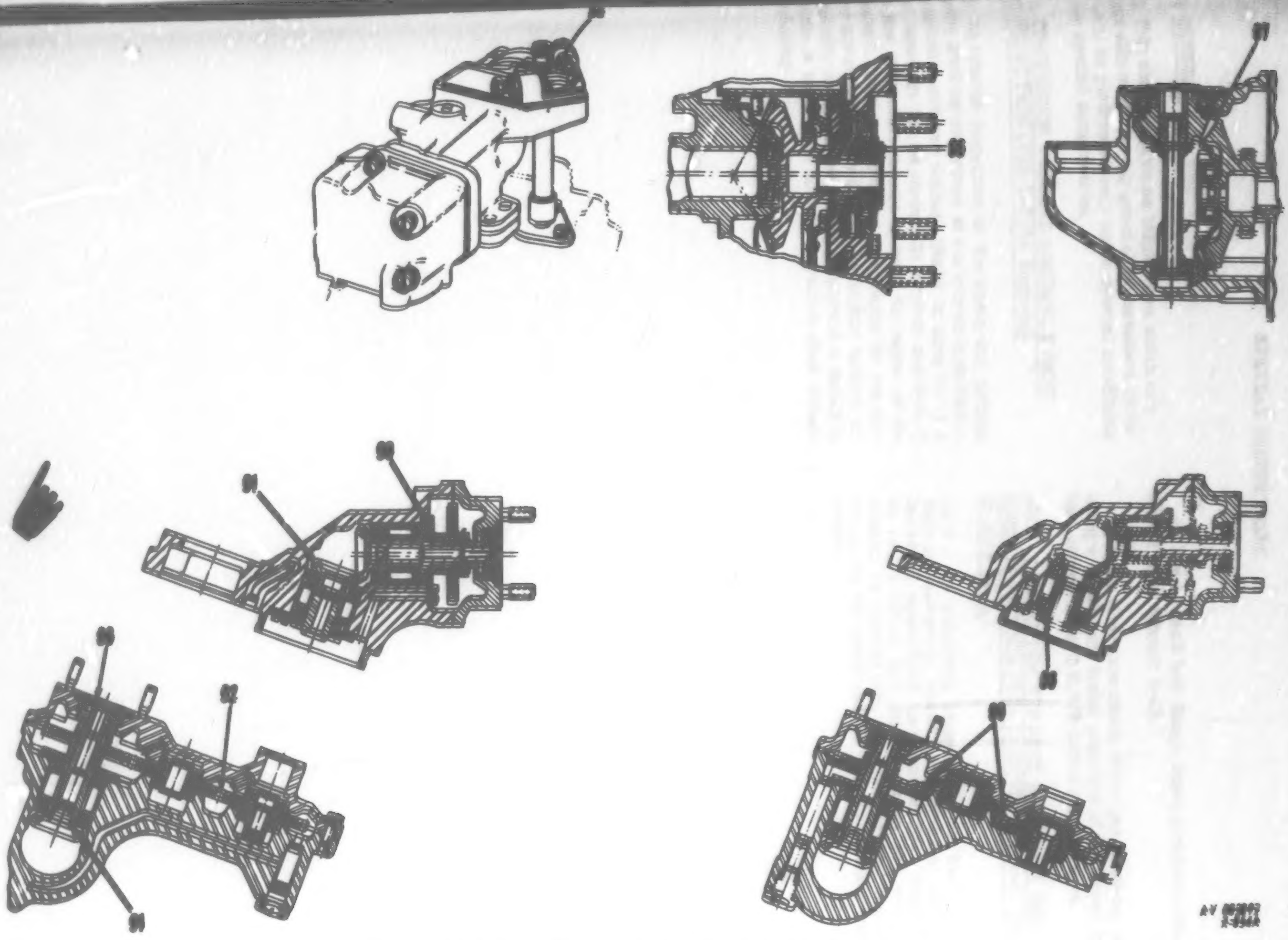

Figure 11-4. Fits, Clearances and Backlashes (Sheet 7 of 7)

CHAPTER 12

SPECIAL INSPECTIONS

GENERAL

This chapter contains inspections which are
rmally made during general maintenance cycle
e to be performed only under special conditions
r special occurrences.

COMBUSTOR TURBINE ASSEMBLY (HOT
NSPECTION (T53-L-7/7A Engines).

An internal inspection of the combustor turbine
bly shall be performed at the interval specified in
plicable airframe manual. (Refer to table 12-1.) A
inspection can be made with a mirror and light. If
ual inspection reveals a need for repair or re-
ment, refer to applicable paragraphs for the par-
component. Disassemble combustor turbine as-
only as far as necessary to correct a defective
on. A combustor turbine inspection shall include
owing:

a. Power shaft bolt flange depth measurement. (Refer to paragraph 3-45.)

b. A tip clearance check of the gas producer rotor, using a 0.025 inch feeler gage and of the power turbine rotor, using a 0.025 inch diameter wire.

12-5. COMBUSTOR TURBINE ASSEMBLY (HOT END) INSPECTION (T53-L-15/701 Engines). (Refer to table 12-2.)

12-6. An internal inspection of the combustor turbine assembly shall be performed at the interval specified in Chapter 13. Depending on which first and second stage gas producer nozzle is installed, the inspection interval shall be as outlined in the following paragraph.

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Table 12-1. Internal (Hot End) Inspection Checklist (T53-L-7/7A)

COMPONENT	INSPECT FOR	REMARKS
Internal Components in General	Indications of uneven combustion (e.g., heat damage or uneven carbon buildup)	Visually inspect. (Refer to paragraphs 7-40 and 12-7.)
Power Shaft Rear Internal Threads	Damage	Visually inspect
First Stage Turbine Wheel	1. Tip clearance	1. Minimum clearance is 0.025 inch. (Refer to paragraph 3-47.)
	2. Blade damage	2. Visually inspect. (Refer to paragraph 7-50.)
	3. Disc damage	3. Visually inspect. (Refer to paragraph 7-50.
First Stage Nozzle and Flange Assembly	1. Nozzle for buring, distortion and cracks 2. Flange for distortion 3. Bolts for security	1. Visually inspect. (Refer to paragraph 7-52.)
Deflector Curl	Cracks	Visually inspect
Air Diffuser	1. Third row vanes for nicks, dents, burrs, cracks, and minor punctures	1. Visually inspect. (Refer to paragraph 7-53.)
	2. Broken oil lines	2. Check lower portion of diffuser for evidence of oil.
	3. Third row vane brazements for minor cracks, voids, and crack-like indications	3. Acceptable provided other requirements are met
Power Turbine Assembly	1. Blade tip clearance	1. Minimum clearance is 0.025 inch. (Refer to paragraph 3-46.)
	2. Blade damage	2. Visually inspect. (Refer to paragraph 7-49.)

a. The criteria for hot end inspection is determined by the gas producer nozzle with the lowest number of dependable hours. First stage gas producer nozzle (1-110-520-19) in combination with second stage gas producer nozzle (1-120-000-14) shall be inspected every 900 hours. First stage gas producer nozzle (1-110-520-19) in combination with second stage gas producer nozzle (1-120-000-06) shall be inspected every 900 hours. First stage gas producer nozzle (1-110-520-14/-21) in combination with any second stage gas producer nozzle shall be inspected every 600 hours.

b. Deleted.

c. Deleted.

d. Deleted.

e. Deleted.

f. Deleted.

Table 12-1. Internal (Hot End) Inspection Checklist (T53-L-7/7A) (Cont)

COMPONENT	INSPECT FOR	REMARKS
Power Turbine Assembly (Cont)	3. Disc damage	3. Visually inspect. (Refer to paragraph 7-49.)
	4. No. 3 seal leakage	4. Check inner cone of exhaust diffuser from forward face aft for evidence of oil streaks. Check aft face of disc by use of mirror and light inspection
Power Turbine Oil Tubes	Leakage	Visually inspect. (Refer to paragraph 7-42.)
Power Turbine Nozzle and Cylinder Assembly	1. Nozzle for burning, distortion and cracks 2. Cylinder for distortion	1. Visually inspect. (Refer to paragraphs 7-43 and 7-44.) 2. Refer to paragraph 7-44.
Combustion Chamber Assembly	Cracks, hot spots, burned areas, or buckling	Visually inspect. (Refer to paragraph 7-45.)
Combustion Chamber Drain Valve	Torque of 35 to 40 pound-inches on attaching bolts	If bolts are loose, remove valve; replace gasket and check for cleanliness and proper operation. (Refer to paragraph 7-45.) Reinstall
Combustion Chamber Liner	1. Cracks or burn damage	1. Visually inspect. (Refer to paragraph 7-46.)
	2. Vaporizer seals for damage	2. Check for excessive movement
	3. Liner brackets for damage	3. Check liner for excessive movement
Fuel.Vaporizers	Cracks, burn damage, clogging, and warpage	Visually inspect. (Refer to paragraph 7-47.)
Starting Fuel Nozzles	Evidence of clogging and improper operation	Visually inspect. (Refer to paragraphs 7-90 and 7-91.)
Igniter Plugs	Cracks in ceramic and evidence of contact with liner	Remove and clean igniter plugs and visually inspect. (Refer to paragraphs 7-119 and 7-120.)
V-Band Coupling	1. Cracks	1. Visually inspect. (Refer to paragraph 7-45.)
	2. Proper torque of bolts	2. Use torque wrench
Exhaust Diffuser	Cracks, burns, and buckling	Visually inspect. (Refer to paragraph 7-48.)

NOTE: Perform vibration test and Jetcal test following engine reassembly. (Refer to paragraph 10-16 for vibration test and paragraph 4-7 for Jetcal test.)

Table 12-2. Internal (Hot End) Inspection Checklist (T53-L-15/701)

COMPONENT	INSPECT FOR	REMARKS
Components in General	Indications of uneven combustion (e.g., heat damage or uneven carbon buildup)	Visually inspect. (Refer to paragraph 7-54.)
haft Rear Internal Threads	Damage	Visually inspect
Stage Gas Producer ssembly and Second as Producer Cylinder	1. Tip clearance	1. Minimum clearance is 0.020 inch. (Refer to paragraph 3-52.)
	2. Blade damage	2. Visually inspect. (Refer to paragraph 7-64.)
	3. Disc damage	3. Visually inspect. (Refer to paragraph 7-64.)
	4. Cylinder Damage	4. Visually inspect. (Refer to paragraph 7-65.)
	5. Bolts for security	5. Visually inspect
Stage Gas Producer Assembly	1. Burning, distortion, and cracks	1. Visually inspect. (Refer to paragraph 7-65.)
	2. Axial clearance between nozzle and second stage gas producer rotor assembly at blade roots	2. Minimum clearance is 0.125 inch. Measure with bent wire. (Refer to paragraph 9-25.)
age Gas Producer ssembly	Blade damage	Visually inspect through second gas producer nozzle, using mirror. (Refer to paragraph 7-66.)
age Gas Producer Assembly	1. Cracks in curl	1. Visually inspect. (Refer to paragraph 7-68.)
	2. Uneven liner wear on curl	2. Visually inspect. (Refer to paragraph 7-68.)
	3. Cracks in vane brazements and outer shroud	3. Visually inspect. (Refer to paragraph 7-68.)
	4. Cracks in cylinder	4. Visually inspect. (Refer to paragraph 7-68.)
	5. Check for interference fit between curl and combustion chamber liner	5. Dimples on ID of liner must contact OD of curl. Verify by applying iron-blue pigment (item 55, table Z-Z) to liner dimples and mating nozzle and liner to simulate hot end installation. Lower hot end on to engine and ensure it is completely seated. Raise hot end off the engine and inspect that liner to curl contact is evident through 360 degrees. If contact is not evident through 360 degrees bend tabs inward as required. Clean off iron-blue pigment and repeat procedure until 360 degree contact is made.
ser	1. Third row vanes for nicks, dents, burrs, cracks, and minor punctures	1. Visually inspect: Blend-repair sharp projections
	2. Broken oil lines	2. Check lower portion of diffuser for evidence of oil
	3. Third row vane brazements for minor cracks, voids and crack-like indications	3. Acceptable provided other requirements are met
d Second Stage Power Nozzle Assemblies	Burning, cracks, and distortion	Visually inspect. (Refer to paragraphs 7-57 and 7-59.)
ge Power Turbine ssembly	1. Blade damage 2. Bolts for security	Visually inspect. (Refer to paragraph 7-58.)

Table 12-2. Internal (Hot End) Inspection Checklist (T53-L-15/701) (Cont)

COMPONENT	INSPECT FOR	REMARKS
Second Stage Power Turbine Rotor Assembly	1. Tip clearance 2. Blade damage	1. Minimum tip clearance 0.025 inch. (Insert wire through rea of exhaust diffuser.) 2. Visually inspect. (Refer to paragraph 7-63.)
Combustion Chamber Housing	Cracks, hot spots, burned areas, or buckling	Visually inspect. (Refer to paragraph 7-60.)
Combustion Chamber Drain Valve	Torque of 35 to 40 pound-inches on attaching bolts	If bolts are loose, remove valve, replace gasket and check for cleanliness and proper operation. (Refer to paragraph 7-60.) Reinstall
Combustion Chamber Liner	1. Cracks or burn damage 2. Liner brackets for damage 3. Check for interference fit between combustion chamber liner and first stage gas producer nozzle curl	1. Visually inspect. (Refer to paragraph 7-61.) 2. Check liner for excessive movement 3. Dimples on ID of liner must contact OD of curl. Verify by applying iron-blue pigment, (item 55, table 2-2), to liner dimples and mating nozzle and liner to simulate hot end installation. If contact is not evident through 360 degrees, carefully bend liner tab(s) inward as required
Fuel Nozzles	Burn damage and clogging	Visually inspect
Starting Fuel Nozzles	Evidence of clogging and improper operation	Visually inspect
Igniter Plugs	Cracks in ceramic and evidence of contact with liner	Visually inspect. (Refer to paragraph 7-121.)
V-Band Coupling	1. Cracks 2. Proper torque of bolts	1. Visually inspect. (Refer to paragraph 7-55.) 2. Use torque wrench. (Refer to paragraph 11-7.)
Exhaust Diffuser	Cracks, burns, and buckling	Visually inspect. (Refer to paragraph 7-62.)

NOTE: Perform vibration test and Jetcal test following engine reassembly. (Refer to paragraph 10-16 for vibration test and paragraph 4-7 for Jetcal test.)

-7. INSPECTION OF FIRST STAGE TURBINE ZZLE AND COMBUSTION CHAMBER LINER R HEAT AND DISTORTION (T53-L-7/7A Engines).

-8. When the combustor turbine assembly is re- ved for any reason, inspect the first stage turbine zle and combustion chamber liner for localized ning and heat distortion. Burning and heat dis- tion are most frequently caused by uneven fuel tribution due to clogging of fuel system compo- nts. This inspection shall be accomplished as lows:

a. Inspect each vaporizer assembly for excessive- burned exit legs and heavy carbon formation in un- n overall pattern. If these conditions exist and of liner baffle discs corresponding to exit legs of s vaporizer is soot free, while the other is heavily boned, vaporizer flow divider is partially clogged s not centered on the splitter (partition) within porizer tube. Replace vaporizer. (Refer to para- phs 6-13 or 6-20 and 8-70 or 8-74.)

b. Inspect for general condition of all liner baffle s corresponding to vaporizer exit legs. If par- ular set of baffle discs shows no evidence of soot dup as compared to remaining baffle discs, vapor- r flow divider, fuel injector in fuel manifold con- tor, or fuel manifold itself is clogged. Replace porizer and fuel manifold. (Refer to paragraphs 13 or 6-20 and 8-70 or 3-74.)

c. Inspect for burning and/or heat distortion in e with starting fuel nozzle. If this condition exists, place starting fuel nozzles. (Refer to paragraphs 34 through 5-37.)

d. Inspect seal (6, figure 3-23) for cuts, nicks, rs, cracks, distortion, pliability, and wear. If mage is evident replace seal.

-9. INSPECTION OF FIRST STAGE TURBINE TOR BLADE DISPLACEMENT (T53-L-7/7A En- es).

-10. When the combustor turbine is removed for reason, visually inspect the aft side of the first ge turbine rotor assembly for blades or blade ges that have moved forward in the disc.

a. Blade roots that are recessed 0.025 inch or s are acceptable.

b. One or more blades or blade wedges that are essed more than 0.025 inch are unacceptable first stage turbine rotor assembly must be re- ed and repaired. (Refer to paragraphs 3-48 and 52.)

c. Check first stage turbine blade tip clearance. er to paragraph 3-47.)

12-11. INSPECTION OF NO. 3 BEARING SEAL.

12-12. Inspect No. 3 bearing positive contact seal as follows:

a. Inspect seal under the following conditions.

(1) Engine oil consumption is excessive.

(2) Oil is observed dripping from aft end of engine or tailpipe after shutdown.

(3) Excessive exhaust smoke is noticed during engine operation.

(4) If thick deposit of soft, wet carbon is evident on cooling air deflector in area of bolt holes or on rear face of power turbine wheel.

b. Disassemble second stage turbine rotor assembly as outlined in paragraphs 6-18 and 6-22.

c. Inspect seal (7, figure 6-14 or 9, figure 6-20) for evidence of damage. Replace seal if damaged, or if oil leakage past seal has been noted (preceding step a.) (Refer to paragraphs 7-49 and 7-63.)

12-13. OVERTEMPERATURE LIMITS AND INSPECTION.

12-14. When maximum starting and transient exhaust gas temperatures shown in table 12-3 have been exceeded, an internal (hot end) inspection is required. (Refer to paragraphs 12-3 and 12-5.)

12-15. OVERSPEED LIMITS.

12-16. An engine overspeed exists under the following conditions:

a. When the steady state maximum allowable compressor rotor speed (N1) exceeds 101.5 percent (25,600 rpm) at any time.

b. When the propeller shaft speed exceeds:

(1) 1850 rpm (23,000 N2 rpm) as a maximum limit.

(2) 1720 rpm (21,300 N2 rpm) for more than 3 seconds total elapsed time.

NOTE

Below 85 percent N1 (T53-L-7/7A engines), a propeller shaft speed of 1780 rpm (with no time limit) is permissible.

Below 91 percent N1 (T53-L-15/701 engines), a propeller shaft speed of 1750 rpm (with no time limit) is permissible.

CAUTION

For the T53-L-7/7A engines, there is no overspeed control if the fuel selector is set on EMERGENCY.

Table 12-3. Maximum Exhaust Gas Temperatures

POWER RATING		T53-L-7/7A	T53-L-15	T53-L-701
Starting	Any Time	760°C (1400°F)	760°C (1400°F)	760°C (1400°F)
	5 Seconds	650°C (1200°F)	675°C (1250°F)	675°C (1250°F)
Transient	Any Time	760°C (1400°F)	760°C (1400°F)	760°C (1400°F)
	5 Seconds	650°C (1200°F)	675°C (1250°F)	675°C (1250°F)
Takeoff (5 minutes)		640°C (1184°F)		
Military (30 minutes)		640°C (1184°F)	625°C (1160°F)	630°C (1165°F)
Normal (Continuous)		620°C (1148°F)	610°C (1130°F)	613°C (1135°F)

NOTE

If the engine cannot be operated without exceeding takeoff, military, or normal rated power EGT limits, this is an indication of operation in excess of normal capabilities, engine malfunction, or instrument error. Refer to table 4-1 to determine cause and corrective action.

12-17. OVERSPEED INSPECTION - LIMITS EXCEEDED.

12-18. If overspeed limits are exceeded, perform the following inspection:

a. Check oil filter for metal chips, lint, or other foreign material. (Refer to paragraph 5-109.)

b. Check chip detector for metal chips. (Refer to paragraph 7-113.)

c. If N1 limits (101.5 percent) have been exceeded, proceed as follows:

(1) Perform an internal (hot end) inspection. (Refer to paragraphs 12-3 and 12-5.)

(2) Perform runout and tip clearance check on gas producer turbine wheel.

(3) Check compressor rotor assembly by rotating and listening for rubbing sounds.

(4) Determine and correct cause of overspeed.

(5) Perform initial check run. If no discrepancies are noted, the engine is serviceable.

d. If propeller shaft rpm has exceeded 1720 rpm (21,300 N2 rpm) for more than 3 seconds total elapsed time, proceed as follows:

(1) Visually inspect (by tailpipe access) power turbine for damaged or missing blades.

(2) Perform tip clearance check on power turbine blades. On T53-L-15/701 engines, check only second stage power turbine blades.

(3) Determine and correct cause of overspeed.

(4) Perform initial check run. If no discrepancies are noted, the engine is serviceable.

e. If propeller shaft rpm has exceeded maximum limit of 1850 rpm, proceed as follows:

(1) Perform an internal (hot end) inspection. (Refer to paragraphs 12-3 and 12-5.)

(2) Perform fluorescent-penetrant inspection on power turbine discs. No cracks are permitted.

(3) Determine and correct cause of overspeed.

(4) Perform initial check run. If no discrepancies are noted, the engine is serviceable.

12-19. OVERTORQUE LIMITS AND INSPECTION.

12-20. Maximum allowable operating torque is 3580 pound-feet (102 psi) for the T53-L-7/7A/15 engines or 4785 pound-feet (130 psi) for T53-L-701 engines. However, limited operation above these limits is permissible for a short time. (See figures 12-1 and 12-2.)

NOTE

Monitoring of gages is necessary to prevent engine operation in excess of limits in following step a.

a. Allowable torque limits are indicated in table 12-4.

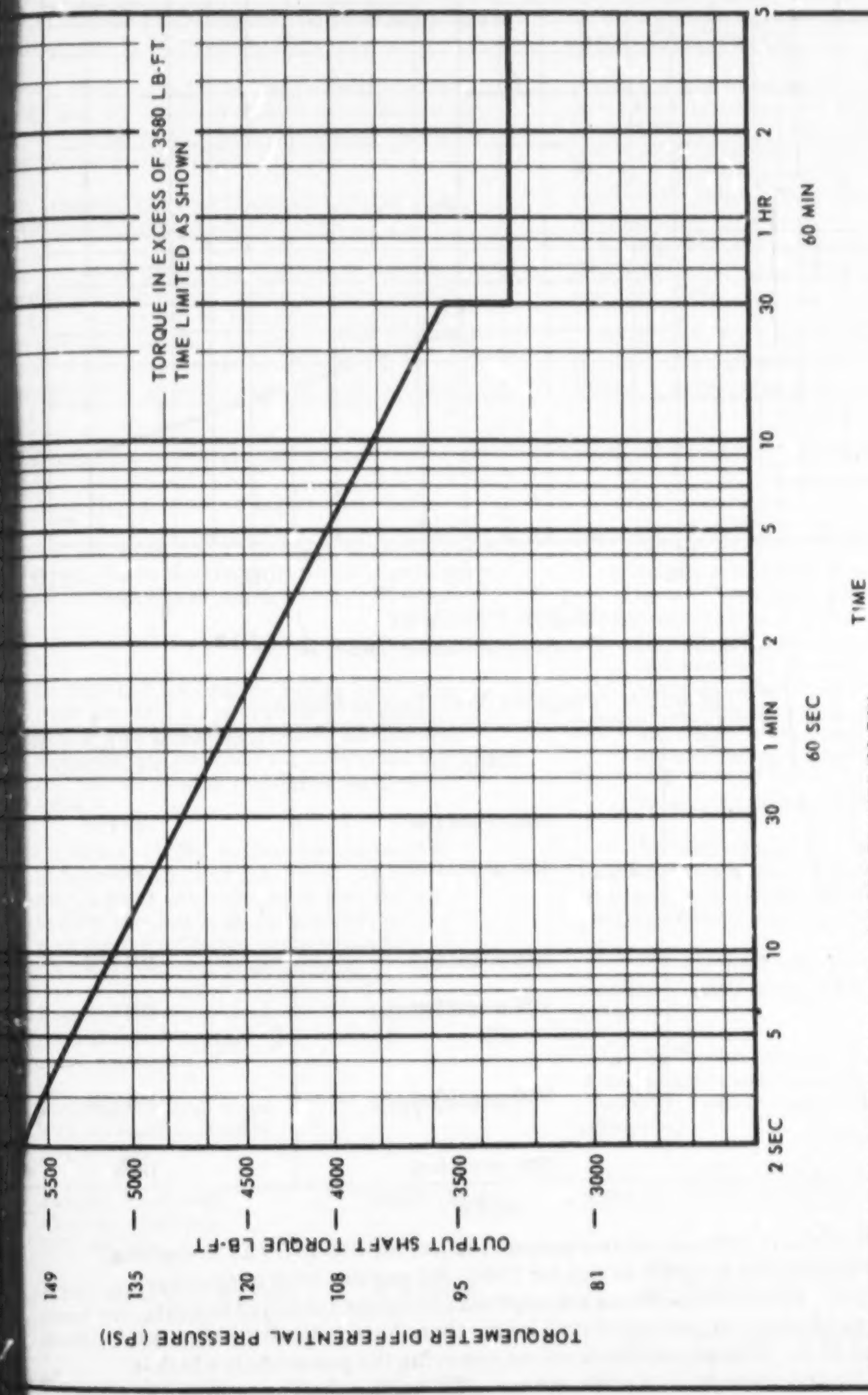
b. When an engine has exceeded overtorque limits, proceed as follows:

(1) Inspect reduction gear assembly. (Refer to paragraphs 7-71 and 7-72.)

(2) Inspect chip detector for metal chips.

(3) Inspect oil filter for metal chips or other foreign matter.

(4) If normal accumulation of foreign matter is observed, clean chip detector and oil filter. Operate engine for 10 minutes and repeat preceding steps (2) and (3).



NOTES: MAXIMUM CONTINUOUS TORQUE 3280 FOOT-POUNDS (89 PSI).

TORQUEMETER DIFFERENTIAL PRESSURE DOES NOT INCLUDE TORQUE LIMITER AND AIRFRAME INSTRUMENTATION ERROR.

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Figure 12-1. Overtorque Limits (T53-L-7/7A/15)

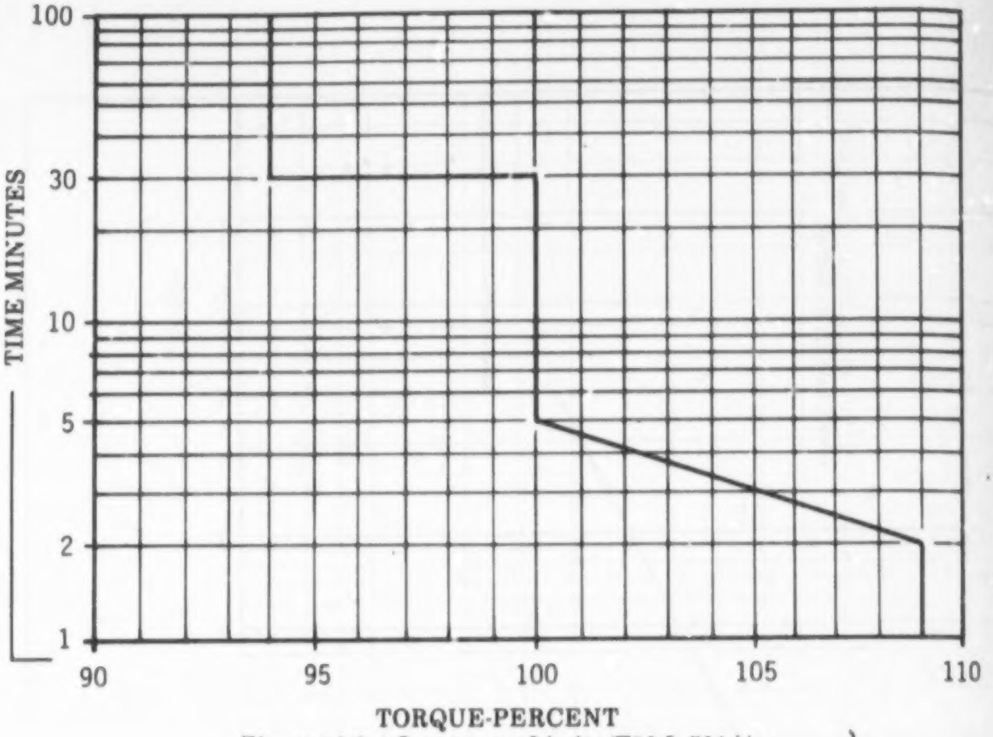


Figure 12-2. Overtorque Limits (T53-L-701A)

Table 12-4. Propeller Shaft Torque Limits

SERVICE	TORQUE	MAXIMUM TORQUEMETER INDICATION
For continuous T53-L-7/7A	3280 pound-feet	89 PSI
T53-L-701A	4500 pound-feet	94%
For 30 minutes		
T53-L-7/7A	3580 pound-feet	102 PSI
753-L-701A	4785 pound-feet	100%
For transient (2 seconds or less) T53-L-7/7A	5700 pound-feet	156 PSI
T53-L-701A (2 minutes or less)	5200 pound-feet	109%

NOTE

Operation above 3580 pound-feet torque (102 psi) for T53-L-7/7A/15 engines, or 4785 pound-feet torque (130 psi) for T53-L-701 engines,is an overtorque operation. Special inspections are required of engines subjected to overtorque conditions for periods of time longer than those indicated in figures 12-1 and 12-2. This inspection involves removing the power shaft which is not within the scope of field maintenance. The engine shall be returned to Depot for inspection.

(5) If excessive accumulation of metal or foreign matter is observed, perform oil contamination inspection. (Refer to paragraph 12-25.)

(6) Repeat preceding step (4) increasing engine operating time to 30 minutes.

(7) Perform flight test and repeat preceding steps (2) and (3). If no excessive accumulation of metal or foreign matter is noted, engine may be released for normal operation.

12-21. INSPECTION REQUIREMENTS OF FUEL CONTROL STRAINERS AND FILTER.

12-22. Inspect, clean, and replace or reinstall pump discharge strainer and servo supply filter (T53-L-7/7A engines) or fuel inlet strainer and servo filter and strainer assembly (T53-L-15/701 engines) at the following intervals: (Refer to paragraphs 5-68 or 5-70, 5-69 or 5-72, and 5-71 or 5-73.)

a. Completion of initial ground runup.

b. After first 5 hours of engine operation.

c. Replace after every 100 hours of engine operation, except where severe contamination exists. In this case, inspection is required every 50 hours.

NOTE

On T53-L-7/7A engines having fuel regulator TA-2F, and on T53-L-15 engines having fuel regulator TA-2W, all required new packings and filters are supplied in fuel and oil system inspection kit (1-200-030-27).

On T53-L-15/701 engines having fuel regulator TA-2V-1 or TA-2V-2, the required parts are supplied in fuel and oil system inspection kit (1-200-030-27) except for the following parts which are supplied individually as follows:

Packing (used with fuel control filter/bypass valve housing)	MS29513-010
Packing (inboard) (used with strainer assembly, P/N 86528)	MS29513-026
Packing (used with strainer assembly, P/N 86528)	MS29513-027
Filter Strap (180 micron) (used with strainer assembly, P/N 86528)	P/N 90488
Strainer Assembly	P/N 86528

d. If contamination persists, or climatic conditions are adverse, operating authorities may require more frequent inspections.

12-23. INSPECTION FOLLOWING THE USE OF EMERGENCY FUELS.

12-24. After an engine has been operated on emergency fuels (gasoline, all types) for a cumulative total of 50 hours, a complete inspection of the combustor section is required. (Refer to TB 55-9150-200-25.) The using activity will determine the necessity of performing the inspection. This shall be accomplished as follows:

a. Remove and disassemble the combustor turbine assembly. (Refer to paragraphs 3-44, 3-50, and 7-40, 7-54.)

b. Remove the first or first and second stage turbine rotor, air deflector, and nozzle assembly. (Refer to paragraphs 3-48, 3-49, and 3-52.)

WARNING

When an engine has operated on leaded fuel, the internal parts of the combustion chamber will be coated with poisonous lead-oxide deposits in powder form. Use all possible precautions to prevent powder from entering any cuts or body openings, particularly the mouth and nostrils. Because of possible absorption, lead-oxide powder must not be allowed to remain on the skin. Always wear gloves and a face mask when disassembling a contaminated engine.

c. Clean all parts as follows:

(1) SAC-coated or aluminized parts (first or first and second stage turbine nozzle, and first or first and second stage turbine rotor), using dry-cleaning solvent method. (Refer to paragraph 7-8.)

(2) All other affected parts, using vapor-blasting (liquid honing) method. (Refer to paragraph 7-9.)

d. Perform a thorough inspection of all parts. Refer to applicable paragraphs for instructions on inspection, repair, and replacement of each affected component.

12-25. INSPECTION AND SOURCE DETERMINATION OF CONTAMINATED OIL.

NOTE

Perform spectrometric oil analysis in accordance with TB 55-6650-300-15.

12-26. Whenever an engine inspection has revealed a continuance or an increase of metal chips in the oil filter or in the chip detector, proceed as follows.

NOTE

This inspection is intended to determine the source of visible metal chips in the oil system normally resulting from the rapid disintegration or failure of an internal part. For the evaluation of microscopic metal contamination observed as the result of spectrometric examination of engine oil, refer to paragraph 12-28.

If composition of visible metal chips can be determined, refer to step c., paragraph 12-28 for probable source areas.

a. Check main oil filter elements for chip accumulation which could have placed the filter into bypass. Clean and reinstall.

b. Remove and inspect the No. 2 bearing strainer and the No. 3 and 4 bearings strainer for metal chips. If chips are present, remove and inspect the overspeed governor and tachometer drive oil throttle strainer. Forward engine to Overhaul if metal chips have clogged more than one-third of the flow area of the previously mentioned strainers. If amount of chips is not excessive, clean and reinstall strainers. Remove, inspect, and clean accessory takeoff pad strainer (supplies Western Gearbox) (7, figure 6-29), and if chips are present, but not excessive, remove and clean the fuel heater as outlined in TM 55-2840-217-40.

c. Presence of chips in the previously mentioned strainers indicates bypass of the oil filter has occurred. Accomplish the following:

(1) Remove the oil filter.

(2) Disassemble the oil filter.

(3) Flush parts and passage using drycleaning solvent (item 28, table 2-2).

(4) Inspect parts for wear and damage; replace as required.

(5) Reassemble oil filter.

(6) Reinstall oil filter.

d. On T53-L-7/7A engines, check No. 2 bearing scavenge line for metal contamination. If chips are evident, forward engine to Depot. On T53-L-15/701 engines, if chips are evident, inspect and replace bearing if required. Flush components with drycleaning solvent (item 28, table 2-2) and reinstall.

e. Check No. 3 and 4 bearings scavenge line for metal contamination. If chips are evident, remove combustor turbine assembly, disassemble power turbine and bearing housing assembly, and inspect bearings. Replace if required. Flush components with drycleaning solvent (item 28, table 2-2) and reassemble.

f. Remove reduction gearing (paragraphs 3-53 and 3-54) and inspect its condition and replace, if required, as outlined in paragraphs 9-19 and 9-20. Flush components with drycleaning solvent (item 28, table 2-2) and reassemble.

g. Remove Western Gearbox and inspect drive splines for spalling and wear. Disassemble Western Gearbox and inspect gears and bearings for damage and wear. Replace discrepant gearbox. Reassemble and reinstall gearbox if no defects are noted.

NOTE

Do not reinstall Western Gearbox until this internal inspection is accomplished.

h. Remove accessory drive gearbox. Remove and inspect shaftgear assembly. Particularly note condition of upper and lower bearings on this shaft. Inspect and clean scavenge strainer. Flush shaftgear assembly and internal components of gearbox with drycleaning solvent (item 28, table 2-2) and reassemble.

NOTE

In following step i., if cooler cannot be effectively flushed, it shall be returned to Overhaul.

i. Remove oil tank and cooler. Flush tank and reinstall.

j. Service oil system with lubricating oil (item 63 or 64, table 2-2). Operate engine at 70 to 80 percent N1 for 5 minutes. Shut down engine and allow to cool.

k. Inspect chip detector and oil filter strainers for chips. Amount of chips noted should be less than original amount. If so, repeat preceding steps i. and j., increasing engine operating time to 10 minutes.

l. Repeat inspection, servicing, and operating cycle, increasing engine operating time to 30 minutes. If no appreciable amount of chips is noted, engine may be returned to service. If amount of chips remains the same or increases, ship engine to Depot.

12-27. SPECTROMETRIC OIL INSPECTION.

12-28. When a spectrometric inspection of engine oil indicates the presence of metal contamination, proceed as follows:

a. Check airframe components to determine if contamination results from defective Western Gearbox, or other components which could contaminate engine oil supply.

b. Check for improperly cleaned airframe and engine lubrication system components, such as oil tank, oil cooler, filters, and lines for residual contamination resulting from a previous failure.

c. If preceding steps a. and b. do not indicate the ource of the trouble, evaluate the contamination in ccordance with the predominating metal as indicated y the spectrometric analysis.

(1) Silver/copper and silver/iron predominang metal.

(a) This condition may be an indication of ending bearing failure. Visually determine condiion of bearings.

(b) In some engine areas, bearings may be eplaced at the Direct Support or General Support aintenance level. If defective bearings cannot be eplaced or if secondary damage has occurred, rer engine to Depot Maintenance.

(2) Copper predominating metal.

NOTE

In following step (a), inspection is not required for washer, 1-030-138-04.

(a) Inspect spherical washer of sun gear tainer for wear.

(b) Replace washer if defective.

(3) Iron predominating metal.

(a) Check torquemeter cylinder for wear.

(b) Check reduction gears for wear.

(c) Replace defective parts.

NOTE

Since extremely low concentrations of metal particles can be separately identified and measured by spectrometric analysis, it must be recognized that detected metal particles are of microscopic size, invisible to the naked eye, cannot be felt between the fingers, and capable of passing freely through the oil filters. This presents a problem in troubleshooting since the failing part may be undetectable unless carefully xamined.

d. Drain lubricating oil from engine oil system and discard oil.

e. Refill engine oil system with new lubricating (item 63 or 64, table 2-2).

f. Monitor effectiveness of repair with successive ctrometric oil analysis tests.

NOTE

Obtain oil analysis samples from the oil filler neck utilizing tube from sampling kit.

g. If contamination level does not subside, forward ne to Depot.

12-29. INSPECTION BEFORE AND AFTER INITIAL CHECKRUN.

12-30. The following is the procedure for check runs, and for inspection after check runs.

a. Remove main oil filter cover assembly. Clean cover assembly in drycleaning solvent (item 28, table 2-2), and reinstall.

b. Fill the aircraft oil tank with lubricating oil (item 63 or 64, table 2-2). (Refer to paragraphs 3-33 and 3-34 for changing engine oil.)

WARNING

Prolonged contact with lubricating oil (item 63 or 64, table 2-2) may cause a skin rash. These areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Saturated clothing should be removed immediately. Areas in which lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.

CAUTION

Lubricating oil (item 63 or 64, table 2-2) may soften paint upon contact. If lubricating oil is spilled on painted surfaces, these surfaces should be thoroughly washed.

NOTE

Motor engine, if necessary, as outlined in paragraph 10-6.

c. Start engine.

d. Operate engine for several minutes at ground idle; then shut down.

e. Inspect engine for leaks, and security of mounting of hoses and accessories.

f. Start engine, and run at flight idle for 3 minutes; accelerate gradually to higher power. Allow temperatures to stabilize.

g. Decelerate engine to flight idle, and run until EGT stabilizes for 2 minutes; then shut down engine.

h. Inspect engine for the following:

(1) Leaks and security of mounting provisions, hoses, and accessories.

(2) Accumulation of metal chips, lint, or other foreign material on oil filter, or on chip detector.

i. If there is no accumulation of metal chips, lint, or other foreign material, continue with engine ground operation checks.

j. If there is slight accumulation of metal chips, lint, or foreign material, clean and reinstall chip detector and oil filters. Restart without gaining flight attitude. If further accumulation is found, proceed to following step k.

k. If there is an excessive accumulation of metal chips, lint, or other foreign material, the source must be determined. (Refer to paragraph 12-17.)

l. Remove, inspect, clean, reinstall or replace fuel control filters.

m. Repeat preceding steps c. and d. for final leak check.

12-31. SUDDEN STOPPAGE INSPECTION.

12-32. In the event of a sudden propeller stoppage, at any speed, ship engine to Depot Maintenance.

12-33. INSPECTION AFTER EXCESSIVE ENGINE G-LOAD.

12-34. If it is suspected that excessive G-loads have been imposed on the engine, proceed as follows:

a. The maximum G-loads in direction specified are as follows:

Vertical	10G's
Side	4G's
Forward	3G's
Aft	4G's

b. If it is suspected that excessive G-loads have been imposed on an engine, make the following inspections immediately after flight during which excessive G-loads occurred:

(1) Check overspeed governor and tachometer drive assembly for cracks, distortion, and bent shaft.

(2) Check engine mounting pads for cracks.

(3) Check fuel control, accessory drive gearbox assembly, oil, filter, and all accessories for cracked flanges, loose bolts, nuts, and hose connections for cracks.

12-35. SUSPECTED ENGINE COMPRESSOR STALL INSPECTION.

12-36. Engine compressor stall (surge) is characterized by a sharp rumble or a series of loud, sharp reports, severe engine vibration, and a rapid rise in exhaust gas temperature (EGT), depending on severity of surge. When a surge has been reported, perform the following steps:

a. Discuss reported compressor stall with pilot and/or with unit maintenance officer to determine circumstances surrounding report.

b. Inspect aircraft and engine logs to determine if there is any history that is pertinent to reported problem.

c. Determine the N1 speed at which the reported stall occurred.

NOTE

In following step d., if foreign object damage is evident, refer engine to Depot for repair. Replace the engine if erosion is causing the stall.

d. Inspect engine inlet guide vane and first stage compressor rotor blades for evidence of severe erosion and/or foreign object damage. Check root areas of compressor blades for cutback due to erosion. Check for dirty or obstructed inlet housing.

e. Check that operation of variable inlet guide vanes, bleed band, air-bleed actuator, fuel control, and hot air solenoid valve are not causing the stall. If, as a result in this investigation, it is determined that a genuine surge has occurred and cannot be corrected, it is recommended that engine be shipped to Depot Maintenance.

12-37. GRASS BLOCKAGE INSPECTION.

12-38. If grass blockage is suspected, proceed as follows.

CAUTION

Any time the aircraft is flown in a loose grass/foliage environment, the engine shall be inspected for grass/foliage blockage or to detect presence of any foreign object accumulation in the area of the inlet housing struts and inlet guide vanes. If foreign object accumulation is evident, the first and/or second stage compressor blades must be inspected. Failure to perform this inspection could result in a loss of power.

a. Gain access to and visually inspect inlet housing struts and each inlet guide vane for presence of grass or foliage or any other foreign object blockage.

b. Visually check each inlet guide vane for pre-ence of grass/foliage. Completely remove any reign material that may be lodged on guide vanes, ving particular attention to lower (4- through 8- 'clock) portion of vane assembly.

NOTE

Request assistance from Direct Support Maintenance to accomplish the following.

c. On T53-L-7 series engines if blockage is vident, inspect second stage compressor blades for racks using ultrasonic flaw detector (LTCT4188). flaw detector is not available, accomplish one of e following alternatives.

(1) Index and remove all second stage com-ressor blades. (Refer to paragraph 7-178.) Perform gnetic-particle and fluorescent-penetrant in-ections to determine blade serviceability. (Refer paragraphs 7-30 and 7-31.) No cracks or crack dications are allowed. Reinstall serviceable blades. efer to paragraph 7-178.)

NOTE

If inspection capabilities are not available, replace all second stage compressor blades.

(2) Replace all second stage compressor blades. (Refer to paragraph 7-178.)

d. On T53-L-15/701 series engines if blockage is evident, index and remove all first and second stage compressor blades. (Refer to paragraph 7-179.) Perform magnetic-particle and fluorescent-penetrant inspections to determine blade serviceability. (Refer to paragraphs 7-30 and 7-31.) No cracks or crack indications are allowed. Reinstall serviceable blades. (Refer to paragraph 7-179.)

NOTE

If inspection capabilities are not available, replace all first and second stage compressor blades.

CHAPTER 13

OVERHAUL INTERVAL AND INSPECTION INTERVAL

AREA	OVERHAUL INTERVAL (HOURS)	INSPECTION INTERVAL *	ITEM AND PART NUMBER	
and 11	1200	400	Engine, T53-L-7	1-000-050-01
and 11	1800	900	Engine, T53-L-7A	1-000-050-04
and 11	1800	900	Engine, T53-L-15	1-000-100-01
and 11		900	Engine, T53-L-701	1-000-110-01
and 11		900	Engine. T53-L-701A	1-000-110-03

*Time interval at which hot end inspection must be performed.

WARNING

TM55-1500-328-25 should be referred to concerning mutilation/destruction of items, when they have reached the established life expectancy (finite life), before the items are forwarded for property disposal

NOTE

The Maximum Allowable Operating Time (MAOT) for Engine, T53-L-701 is 2400 hours.

Inspect engine records to determine engine operating hours since last repair at Depot. If no Depot repair exists, use Time Since Overhaul (TSO); if no TSO exists, use total time since new.

APPENDIX A

LIST OF REFERENCES

A-1. REFERENCES.

A-2. The following referenced publications are required for use by Organizational, Direct Support, and General Support Maintenance personnel in performance of their duties.

PUBLICATION NUMBER	TITLE
AR 755-15	Disposal of Supplies and Equipment
DA Pamphlets 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders
MIL-C-5541	Chemical Film and Chemical Film Material for Aluminum and Aluminum Alloys
MIL-F-22191B	Films, Transparent, Flexible, Heat Sealable for Packaging Applications
MIL-I-6866	Fluorescent-Penetrant Method
MIL-I-6868	Magnetic Particle Inspection
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of U.S. Government Property
MIL-W-8611	Tungsten Inert Gas Process
SB708-501 (H4-1)	Federal Supply Code for Manufacturers
TB 55-1500-314-25	Handling, Storage, and Disposal of Army Aircraft Components Containing Radioactive Materials
TB 55-6650-300-15	Spectrometric Oil Analysis
TB 55-8100-200-25	Maintenance of Specialized Reusable Metal Containers for Aircraft Equipment
TB 55-9150-200-25	Engine and Transmission Oils, Fuels and Additives for Army Aircraft
Technical Index No Number	Department of Defense Index of Specifications and Standards
TM 38-750	The Army Maintenance Management Systems
TM 55-1500-204-25/1	General Aircraft Maintenance Manual
TM 55-2840-213-40	GS Maintenance Manual: Dual Element Hydraulic Gear Type Lube and Scavenge Pump Assembly
TM 55-2840-214-40	GS Maintenance Manual: In-line Air Valve Part No. 25830029, 26130071, 26230027, 26330053

PUBLICATION NUMBER	TITLE
TM 55-2840-216-40	GS Maintenance Manual: Power Driven Rotary Lube and Scavenge Pump Model RG17350
TM 55-2840-217-40	General Support Maintenance Manual: Fuel Heater, Part Numbers 5A470 and 5A470-001
TM 55-2840-223-40	GS Maintenance Manual: Hot Air Shutoff Valve, Part No. 28040
TM 55-2840-233-20P	Organizational Maintenance, Repair Parts and Special Tools List, Engine, Aircraft, Turboprop
TM 55-2840-233-34P	DS, GS Maintenance, Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools)
TM 55-4920-317-15	Operation Maintenance and Repair Parts Data: Mobile Trailer Assembly (LTCT44 and TE12062)
TM 55-4920-243-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual: Vibration Monitoring Kit (NSN 4920-00-879-0331)
TM 55-4920-244-15	Organizational, DS, GS, and Depot Maintenance Manual: Tester, Exhaust Gas Temperature, Model BH112JA36 (NSN 4920-00-673-5514)
TM 750-244-1-5	Procedures for the destruction of aircraft and associated equipment to prevent enemy use.

APPENDIX B

MAINTENANCE ALLOCATION CHART

B-1. GENERAL.

a. Only the lowest category of maintenance authorized to perform a maintenance function is indicated in this appendix.

b. A maintenance function, assigned a category, will automatically be authorized to be performed at any higher category.

c. A maintenance function, which cannot be performed at the assigned category, for any reason, becomes the responsibility of the next higher category.

d. The authority to perform a maintenance function does not constitute authority to stock necessary repair parts, but does constitute authority to requisition or otherwise secure necessary repair parts as specified in current supply directives.

B-2. DEFINITIONS. The following list defines the terms used in the Maintenance Allocation Chart.

a. **ADJUST** - To rectify to the extent necessary to bring into proper operating range.

b. **ALIGN** - To adjust two or more components of a system so that their functions are properly synchronized.

c. **CALIBRATE** - To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

d. **INSPECT** - To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

e. **OVERHAUL** - To restore to a condition comparable to new by disassembling the item to determine the condition of each of its component parts and reassembling it, using overhauled or new assemblies and parts.

f. **REBUILD** - To restore an item to a standard as early as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

g. **REPLACE** - To replace unserviceable items with serviceable assemblies, subassemblies, or parts.

h. **REPAIR** To restore an item to serviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.

i. **SERVICE** - To clean, preserve, and replenish fuel, lubricants, hydraulic fluid, deicing fluid, oxygen, etc.

j. **TEST** - To verify serviceability and to detect electrical or mechanical failure by use of test equipment.

k. **SYMBOL O, F, or D** - The applicable symbol, placed in the appropriate column, indicates the category responsible for performing the particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that category. Categories higher than the category marked by symbols are authorized to perform the indicated operation. Symbol definitions are as follows:

(1) "O" - Aviation Unit maintenance (AVUM)

(2) "F" - Aviation Intermediate maintenance (AVIM)

(3) "D" - Aviation Overhaul maintenance (DEPOT)

B-3. DEVIATIONS.

a. Normally, there will be no deviations from the assigned category. In cases of operational necessity, a maintenance function assigned to a category may, on a one-time basis and at the request of the lower category, be authorized the lower category by the maintenance officer of the category to which the function is assigned.

b. The furnishing of special tools, equipment, etc., required by the lower category to perform this function, will be the responsibility of the category to which the function is assigned.

B-4. ADDITONAL INFORMATION.

a. Changes in the maintenance allocation chart will be based on continuing evaluation and analysis by responsible technical personnel and on DA Form 2028 received from field activities.

b. All maintenance prescribed herein will be performed in accordance with applicable publications.

c. In any instance of conflict with current tool and equipment lists, or current supply manuals, this maintenance allocation chart will be the final authority. Each such instance shall be promptly reported on DA Form 2028.

MAINTENANCE ALLOCATION CHART FOR T53-L-7/15/701

(AVSCOM Reg 310-10)

(1)	(2)	(3)											(4)	(5)
		MAINTENANCE FUNCTION												
GROUP NO	FUNCTIONAL GROUP	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	TOOLS AND EQUIPMENT	REMA
03	ENGINE AND RELATED SYSTEMS													
	Engine as a Complete Assembly	0	F** 0*	0					***	0	D		*Vibration **METS ***Refer to A/C	Chec
	Fuel and Oil Hose Assembly	0							0					
	Electrical Cable Assembly and Ignition Leads and Coil Assembly	0							0	0				
	Ignition Unit	0							0					
	Ignitor Plugs	0							0					
	Fuel Control Assembly	0			0				0	0	D			
	Fuel Control Solenoid Valve	0							0					
	Overspeed Governor Assembly	0			0				0		D			
	Fuel Control Filters and Strainers	0							0					
	Bypass Filter (L-7 Series)	0							0					
	Starting Fuel Solenoid Valve	0							0	0				
	Main Fuel Manifolds (T53-L-7)	0							0					
	Main Fuel Manifolds (T53-L-15/701)	0							0	F*	D		*Reversal of	
	Starting Fuel Manifold	0							0					
	Starting Fuel Nozzle	0							0					
	Power-Driven Rotary (Oil) Pump	0			0				0	F	D			

MAINTENANCE ALLOCATION CHART FOR T53-L-7/15/701

(AVSCOM Reg 310-10)

(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	(4) TOOLS AND EQUIPMENT	(5) REMARKS
Rear Bearing (No. 2) Housing Oil Strainer, No. 3 and 4 Bearing Housing Oil Strainer	O							O					
Lube Oil Filter Assembly	O							O	O.				
Chip Detector	O							O					
nterstage Bleed System	O			O									
nterstage Bleed Actuator	O							O	O				
nterstage Bleed Band	O							O	O				
nterstage Bleed Hose Assy	O							O					
ot-Air Solenoid Valve	O							O		D			
lbow, Tube and Bleed Air dapter Assembly	O							O	O				
haust Thermocouple ssembly	O	O						O					
mbustion Chamber Drain alve	O							O	O				
l Temperature Bulb	O							O					
cessory Drive Gearbox	O							O	O				
erspeed Governor and chometer Drive Assembly	O			O*				O	F				*N/A to 701 Engine
ver Driven Rotary oster) Pump	O							O*					*N/A to 701 Engine
p Shaft Seal	O							O					
uction Carrier and Gear sy	F							F	F				

MAINTENANCE ALLOCATION CHART
FOR
T53-L-7/15/701

(AVSCOM Reg 310-10)

(1)	(2)	(3)											(4)	(5)
		MAINTENANCE FUNCTION												
GROUP NO	FUNCTIONAL GROUP	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	TOOLS AND EQUIPMENT	REMA
	Overspeed Governor and Tachometer Drive Support and Gear	F							F	F				
	Accessory Drive Carrier Assembly	F							F					
	Combustion Chamber Housing	O							F	F				
	Combustion Chamber Liner	F							F	F				
	Fuel Vaporizers (T53-L-7)	F							F	F				
	Power Turbine Nozzle and Cylinder (T53-L-7)	F							F	F				
	Fire Shield	O							F	F				
	Support Cone	O							F	F				
	Exhaust Diffuser	O							F	F				
	Power Turbine Rotor Assembly (T53-L-7)	O*							F	F			*Visual Insp	
	Gas Producer Turbine Rotor Assembly (T53-L-7)	F							F	F				
	Gas Producer Turbine Nozzle and Flange (T53-L-7)	F							F	F				
	Combustion Chamber Deflector	F							F	F				
	Air Diffuser Housing	O							D	F				
	Rear Bearing Seal and Seal Housing	F							F					
	Rear Bearing Seal Liner and Forward and Rear Cones	F							F					

MAINTENANCE ALLOCATION CHART FOR T53-L-7/15/701

(AVSCOM Reg 310-10)

(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION											(4) TOOLS AND EQUIPMENT	(5) REMARKS
	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
Impeller Housing	0							F	F				
Compressor Housing	0							F	F				
Compressor Stator Vanes	F							F	F				
Compressor Rotor Blades	0*							F	F			*Visual Insp first stage-	
Power Shaft	F							D					
Inlet Housing	0							D	0*			*Corrosion Control	
Air Inlet Vanes	0							D	F				
Variable Inlet Guide Vane Assembly (T53-L-15/701)	0							D	F				
Flow Divider and Dump Valve Assembly (T53-L-15/701)	0							0	0				
Inlet Guide Vane Actuator Assembly (T53-L-15/701)	0			0				0		D			
Inlet Guide Vane Actuator Hose (T53-L-15/701)	0							0					
First and Second Stage Power Turbine Nozzle Assembly (T53-L-15/701)	F							F	F				
Second Stage Power Turbine Rotor Assembly (T53-L-15/701)	0*							F	F			*Visual Insp	
First Stage Power Turbine Rotor Assembly (53-L-15/701)	F							F	F				
First and Second Stage Gas Producer Rotor Assembly (T53-L-15/701)	F							F	F				

MAINTENANCE ALLOCATION CHART
FOR
T53-L-7/15/701

(AVSCOM Reg 310-10)

(1)	(2)	(3) MAINTENANCE FUNCTION											(4)	(5)
GROUP NO	FUNCTIONAL GROUP	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	TOOLS AND EQUIPMENT	REM
	First and Second Stage Gas Producer Nozzle and Flange T53-L-15/701)	F							F	F				
	Rear Bearing Aft Seal Housing (T53-L-15/701)	F							F					
	Rear Bearing Forward Seal and Forward Rear oil Rings and Cones (T53-L-15/701)	F							F					
	Rear Bearing and Rear Bearing Housing (T53-L-15/701)	F							F					
	Rear Bearing Forward Seal and Forward Rear Oil Rings and Cones (T53-L-7 Series Eng)	F							D					
	Rear Bearing and Rear Bearing Housing (T53-L-7 Series Eng)	F							D					
	Fuel Control Torque Limiter (T53-L-15)	O							O		D			
	Fuel Heater	O							O		D			
	Torque Meter Head Assembly T53-L-701	D							D					
	Torque Meter Junction Box	O							D					
	Sun Gear Shaft T53-L-701	D							D					

APPENDIX B

MAINTENANCE ALLOCATION CHART

SECTION I
INTRODUCTION

1. Maintenance Allocation Chart.

NOTE

Appendix B contains two Maintenance Allocation Charts covering the new and old maintenance levels. Pages B-7 through B-15 are the new Three Level Maintenance Allocation Charts and should be utilized by maintenance units reorganized into three level maintenance activities. Pages B-1 through B-6 are the Maintenance Allocation Charts to be utilized by maintenance activities who have not adopted the new three level maintenance concept.

a. This Maintenance Allocation Chart (MAC) signs maintenance functions in accordance th the Three Levels of Maintenance concept r Army aircraft. These maintenance levels, viation Unit Maintenance (AVUM); Aviation termediate Maintenance (AVIM) and Depot intenance are depicted on the MAC as:

AVUM which corresponds to the O Code in the RPSTL
AVIM which corresponds to an F Code in the RPSTL
DEPOT which corresponds to a D Code in the RPSTL

b. The maintenance to be performed below pot and in the field is described as follows:

(1) Aviation Unit Maintenance (AVUM) ac- ities will be staffed and equipped to perform h frequency "On-Aircraft" maintenance ks required to retain or return aircraft to a viceable condition. The maintenance capabil- of the AVUM will be governed by the Main- ance Allocation Chart (MAC) and limited by amount and complexity of ground support ipment (GSE), facilities required, and num- of spaces and critical skills available. The ge and quantity of authorized spare modules/components will be consistent with the mobility requirements dictated by the air mobility concept. (Assignments of maintenance tasks to divisional company size aviation units will consider the overall maintenance capability of the division, the requirement to conserve personnel and equipment resources and air mobility requirements.)

(a) Company Size Aviation Units: Perform those tasks which consist primarily of preventive maintenance and maintenance repair and replacement functions associated with sustaining a high level of aircraft operational readiness. Perform maintenance inspections and servicing to include perflight, daily, intermediate, periodic and special inspections as authorized by the MAC or higher headquarters. Identify the cause of equipment/system malfunctions using applicable technical manual troubleshooting instructions, build-in-test equipment (BITE), installed aircraft instruments, or easy to use/interpret diagnostic/fault isolation devices (TMDE). Replace worn or damaged modules/components which do not require complex adjustments or system alignment and which can be removed/installed with available skills, tools and equipment. Perform operational and continuity checks and make minor repairs to the electrical system. Inspect service and make operational, capacity and pressure checks to hydraulic systems. Perform servicing, functional adjustments, and minor repair/replacement to the flight control, propulsion, power train and fuel systems. Accomplish air frame repair which does not require extensive disassembly, jigging, or alignment, the manufacture of air frame parts will be limited to those items which can be fabricated with tools and equipment found in current air mobile tool and shop sets. Evacuate unserviceable modules/components and end items beyound the repair capability of AVUM to the supporting AVIM.

(b) Less than Company Size Aviation

Units: Aviation elements organic to brigade group, battalion headquarters and detachment size units are normally small and have less than ten aircraft assinged. Maintenance tasks performed by these units will be those which can be accomplished by the aircraft repairman and will normally be limited to preventive maintenance, inspections, servicing, spot painting, stop drilling, application of nonstress patches, minor adjustments, module/component fault diagnosis and replacement of selected modules/components. Repair functions will normally be accomplished by the supporting AVIM unit.

(2) Aviation Intermediate Maintenance (AVIM) provides mobile, responsive "One Stop" maintenance support. (Maintenance functions which are not conductive to sustaining air mobility will be assigned to depot maintenance.) Performs all maintenance functions authorized to be done at AVUM. Repair of equipment for return to user will emphasize support or operational readiness requirements. Authorized maintenance includes replacement and repair or modules/components and end items which can be accomplished effeciently with available skills, tools, and equipment. Establishes the Direct Exchange (DX) program for AVUM units by repairing selected items for return to stock when such repairs cannot be accomplished at the AVUM level. Inspects, troubleshoots, test diagnoses, repairs, adjusts, calibrates, and aligns aircraft system modules/components. AVIM units will have the capability to determine the serviceability of specified modules/components removed prior to the expiration of the Time Between Overhaul (TBO) or finite life. Module/component disassembly and repair will support the DX program and will normally be limited to tasks requiring cleaning and the replacement of seals, fittings, and items of common hardware. Air frame repair and fabrication of parts will be limited to those maintenance tasks which can be performed with available tools and test equipment. Unserviceable reparable modules/components and end items which are beyound the capability of AVIM to repair will be evacuated to Depot Maintenance. This level will perform aircraft weight and balance inspection and other special inspections which exceed AVUM capability. Provides quick response maintenance support, including aircraft recovery and air evacuation, on-the-job training, and technical assistance through the use of mobile maintenance contact terms. Maintains authorized operational readiness float aircraft. Provides collection and classificaiton services for serviceable/unserviceable material. Operates a cannibalization activity in accordance with AR 750-50. (The aircraft maintenance company within the maintenance battalion of a division will perform AVIM functions consistent with ai mobility requirements and conservation of personnel and equipment resources. Additional intermediate maintenance support will be provided by the supporting non-divisional AVIM unit.)

B-2. Use of the Maintenance Allocation Chart.

Nomenclatures used throughout the MAC (Section II) are approved Army terms. Those terms/nomenclatures expressed in parenthesis are generic in nature and are not to be considered as official terminology.

a. The Maintenance Allocation chart assigns maintenance functions to the lowest level of maintenance based on past experience and the following consideration:

(1) Skills available.

(2) Time required.

(3) Tools and test equipment required and/or available.

b. Only the lowest level of maintenance au thorized to perform a maintenance function i indicated.

c. A maintenance function assigned to maintenance level will automatically be author ized to be performed at any higher maintenanc level.

d. A maintenance function that cannot b performed at the assigned level of maintenanc for any reason may be evacuated to the nex higher maintenance organization. Higher main tenance levels will perform the maintenanc functions of lower maintenance levels when re quired or directed by the appropriate com mander.

e. The assignment of a maintenance functio will not be construed as authority to carry th associated repair parts in stock. Authority t requisition, stock, or otherwise secure necessar repair parts will be as specified in the repai parts, Special Tools List.

f. Normally there will be no deviation from the assigned level of maintenance. In cases of operational necessity, maintenance functions assigned to a maintenance level may, on a one-time basis and at the request of the lower maintenance level, be specifically authorized by the maintenance officer of the level of maintenance to which the function is assigned. The special tools, equipment, etc., required by the lower level of maintenance to perform this function will be furnished by the maintenance level to which the function is assigned. This transfer of a maintenance function to a lower maintenance level does not relieve the higher maintenance level of the responsibility of the function. The higher level of maintenance will provide technical supervision and inspection of the function being performed at the lower level.

g. Maintenance of the US Army Electronics Command equipment will be performed by designated US Army Electronics Command personnel.

h. Changes to the Maintenance Allocation Chart will be based on continuing evaluation and analysis by responsible technical personnel and on reports received from field activities.

3. Definitions.

Maintenance functions. Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine serviceability of an item by comparing its physical, mechanical and electrical characteristics with established standards through examination.

b. Test. To verify serviceability and detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with perscribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (deocontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids or compressed air supplies.

d. Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. The act of substituting a serviceable like type part, subassembly, or module (components or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services or other maintenance actions to restore serviciIity to an item by correcting specific damage, fault, malfunction, or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipments/components.

MAINTENANCE ALLOCATION CHART FOR T53-L-7/7A/15/701

DAAJ01-70-C-0659(55)

(1)

(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	(4) TOOLS & EQUIPMENT	(5) REMARKS
04	ENGINE AND RELATED SYSTEMS													
	Engine as a Complete Assembly	O	H	O		F			F	O	D			
	Fuel and Oil Hose Assembly	O	H						O	O				
	Electrical Cable Assembly and Ignition Leads	O	F						O	O				
	Ignition Unit	O	H						O					
	Igniter Plugs	O	H						O					
	Fuel Control Assembly	O	D	O	O				O		D			
	Fuel Control Solenoid Valve (T53-L-7/7A)	O							O					
	Fuel Control Torque Limiter (T53-L-15)	O	D		H				O	D				
	Topping Governor Assembly	O	D		O				O		D			
	Fuel Control Filters and Strainers	O		O					O	O				
	Bypass Fuel Filter (T53-L-7/7A)	O	H	O					O	O				
	Fuel Heater	O	H						O		H			
	Starting Fuel Solenoid Valve	O	H						O	O				

MAINTENANCE ALLOCATION CHART FOR

T53-L-7/7A/15/701 (Continued) (2)

DAAJ01-70-C-0659(55)

(1)	(2)	(3) MAINTENANCE FUNCTION											(4)	(5)
GROUP NO.	FUNCTIONAL GROUP	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	TOOLS & EQUIPMENT	REMARKS
	Main Fuel Manifolds (T53-L-15 and 701)	O	H						F	D				
	Main Fuel Manifold (T53-L-7/7A)	O	H	O					F	O				
	Starting Fuel Manifold	O	H						F	O				
	Starting Fuel Nozzles	O	H						F	H				
	Power-Driven Rotary (Cil) Pump	O	H		O				O	O	H			
	Rear Bearing (No. 2) Housing Oil Strainer, No. 3 and 4 Bearings Housing Oil Strainer	O		O					O					
	Flow Divider and Dump Valve Assembly (T53-L-15/701)	O	H						F	H				
	Lube Oil Filter Assembly	O	H	O					O	O				
	Chip Detector	O		O					O					
	Interstage Bleed Actuator	O	H						O	O				
	Interstage Bleed Band	O			O				O	O				
	Interstage Bleed Hose Assembly	O	H						O	O				
	Hot-Air Solenoid Valve	O	H						O	O	H			

MAINTENANCE ALLOCATION CHART FOR

DAAJ01-70-C-0659(55)

T53-L-7/7A/15/701 (Continued) (3)

(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	(4) TOOLS & EQUIPMENT	(5) REMARKS
	Inlet Guide Vane Actuator Assembly	O	H		O				O	O				
	Inlet Guide Vane Actuator Hose	O	H						O	O				
	Elbow, Tube and Bleed Air Adapter Assembly	O							O	O				
	Exhaust Thermocouple Assembly	F	F						F					
	Combustion Chamber Drain Valve	O	H						O	O				
	Oil Temperature Bulb	O	H						O	O				
	Accessory Drive Gearbox	O							F	O				
	Overspeed Governor and Tachometer Drive Assembly	O							O	O				
	Power-Driven Rotary (Booster) Pump (T53-L-7/7A/15)	O	H		O				O	F				
	Output Shaft Seal	O							F					
	Reduction Gear Assembly and Sun Gearshaft (T53-L-7/7A/15)	F							F	H				
	Reduction Gear Assembly (T53-L-701)	F							F	D				

MAINTENANCE ALLOCATION CHART FOR

DAAJ01-70-C-0659(55)

T53-L-7/7A/15/701 (Continued) (4)

(1)	(2)	(3) MAINTENANCE FUNCTION											(4)	(5)
GROUP NO.	FUNCTIONAL GROUP	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	TOOLS & EQUIPMENT	REMARKS
	Support Assembly-Rear Bearing-Propeller Shaft	F							F	F				
	Accessory Drive Carrier Assembly	F							D					
	Combustion Chamber Housing	F							F	F				
	Combustion Chamber Liner	F							F	F				
	Fuel Vaporizers (T53-L-7/7A)	F	H						F	F				
	First and Second Stage Power Turbine Nozzle Assembly	F							F	F				
	Fire Shield	F							F	F				
	Support Cone	F							F	F				
	Exhaust Diffuser	F							F	F				
	Power Turbine Rotor Assembly (T53-L-7/7A)	F							F					
	Power Turbine Blades (T53-L-7/7A)	O							D	F*				*Blend Defects
	First Stage Power Turbine Rotor Assembly (T53-L-15/701)	F							F					

MAINTENANCE ALLOCATION CHART FOR T53-L-7/7A/15/701 (Continued)

DAAJ01-70-C-0659(55)

(5)

(1)	(2)	(3) MAINTENANCE FUNCTION											(4)	(5)
GROUP NO.	FUNCTIONAL GROUP	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	TOOLS & EQUIPMENT	REMARKS
	First Stage Power Turbine Blades (T53-L-15/701)	F							D	F*				*Blend Defects
	Second Stage Power Turbine Rotor Assembly (T53-L-15/701)	F							F					
	Second Stage Power Turbine Blades (T53-L-15/701)	O							D	F*				*Blend Defects
	First Stage and Second Stage Gas Producer Rotor Assembly	F							F	D				
	First and Second Stage Gas Producer Rotor Blades	F							D	F*				*Blend Defects
	First and Second Stage Gas Producer Nozzle and Flange	F							F	F				
	Combustion Chamber Deflector	F							F	F				
	Air Diffuser Housing	O							D	F				
	Rear Bearing Aft Seal and Seal Housing	F							F					
	Rear Bearing Forward Seal and Forward Rear Oil Rings and Cones (T53-L-15/701)	F							F					

MAINTENANCE ALLOCATION CHART FOR

DAAJ01-70-C-0659(55)

T53-L-7/7A/15/701 (Continued) (6)

(1)	(2)	(3) MAINTENANCE FUNCTION											(4)	(5)
GROUP NO.	FUNCTIONAL GROUP	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	TOOLS & EQUIPMENT	REMARKS
	Rear Bearing and Rear Bearing Housing (T53-L-15/701)	F							F					
	Impeller Housing	O							F	F				
	Compressor Housing	O							F	F				
	Compressor Stator Vanes	F							F	F				
	Compressor Rotor Blades	O							F	F				
	Power Shaft	F							D					
	Inlet Housing	O							D	F				
	Variable Inlet Guide Vane Assembly (T53-L-15/701)	O							D	F				
	Air Inlet Vanes (T53-L-7/7A)	O							D	F				
	Torquemeter Head Assembly (T53-L-701)	F					D		D					
	Torquemeter Junction Box (T53-L-701)	O					D		D					
	Sun Gearshaft (T53-L-701)	F					D		D					

APPENDIX C

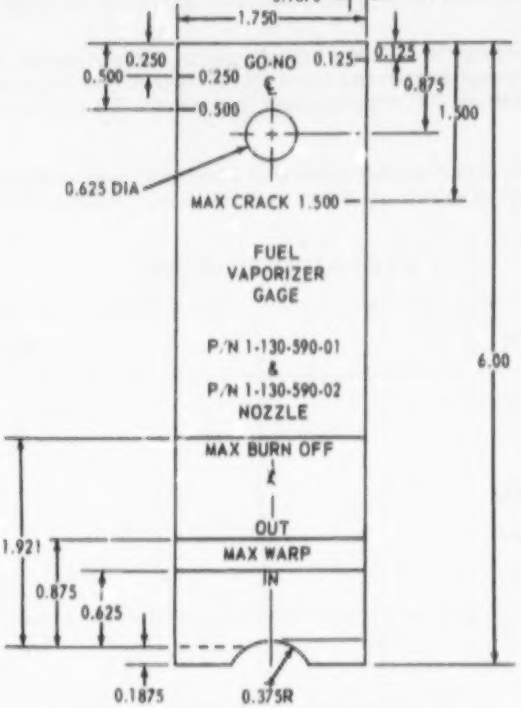
ILLUSTRATED FIELD MANUFACTURE ITEMS LIST

ppendix includes complete instructions, including bills of material, for field maintenance of all items listed in the TM 0-233-34P, Direct Support, General Support and Depot Maintenance Repair Parts and Special Tools Lists, bearing MF H Source Code, and TM 55-2840-233-20P, Organizational Maintenance Repair Parts and Special Tools List, Engine, ft, Turbopropp.

art number index lists all items in part number order with a cross-reference to the figure in which the item appears. All ials necessary for manufacturer of an item are listed, by Federal Stock Number, in the bill of material for the item.

PART NUMBER INDEX

Part Number	Figure Number
5220EG000-3	C-1
2-300-123-01	C-2
MS8000K140G	C-3
1560-EG-150-1	C-4
4710-T53-000	C-5


0.1875
1.750
0.250
0.500
0.250
GO-NO
0.125
0.125
0.875
1.500
0.500
0.625 DIA
MAX CRACK 1.500
FUEL
VAPORIZER
GAGE
P/N 1-130-590-01
&
P/N 1-130-590-02
NOZZLE
6.00
MAX BURN OFF
OUT
MAX WARP
IN
1.921
0.875
0.625
0.1875
0.375R

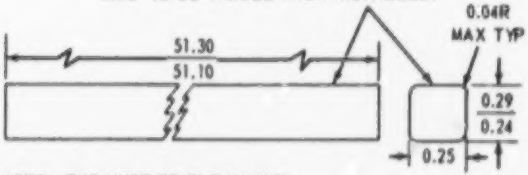
NOTE: ALL DIMENSIONS ARE IN INCHES

PART NUMBER 5220EG000-3, GAGE, FUEL, VAPORIZER
FABRICATE FROM FSN 9535-249-5809

AV 082746
XA-854B

Figure C-1

MARK THIS SIDE WITH BLUE DYE. THIS SIDE TO BE VISIBLE WHEN INSTALLED.

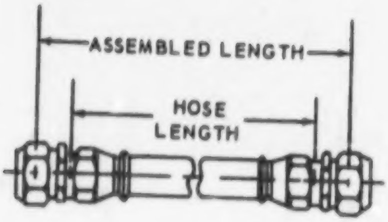

0.04R
MAX TYP
51.30
51.10
0.29
0.24
0.25

NOTE: END MUST BE CLEAN CUT
ALL DIMENSIONS ARE IN INCHES

PART NUMBER 2-300-123-01, PACKING, MATERIAL
FABRICATE FROM FSN 5330-051-7034

AV 081061
XA-854A

Figure C-2

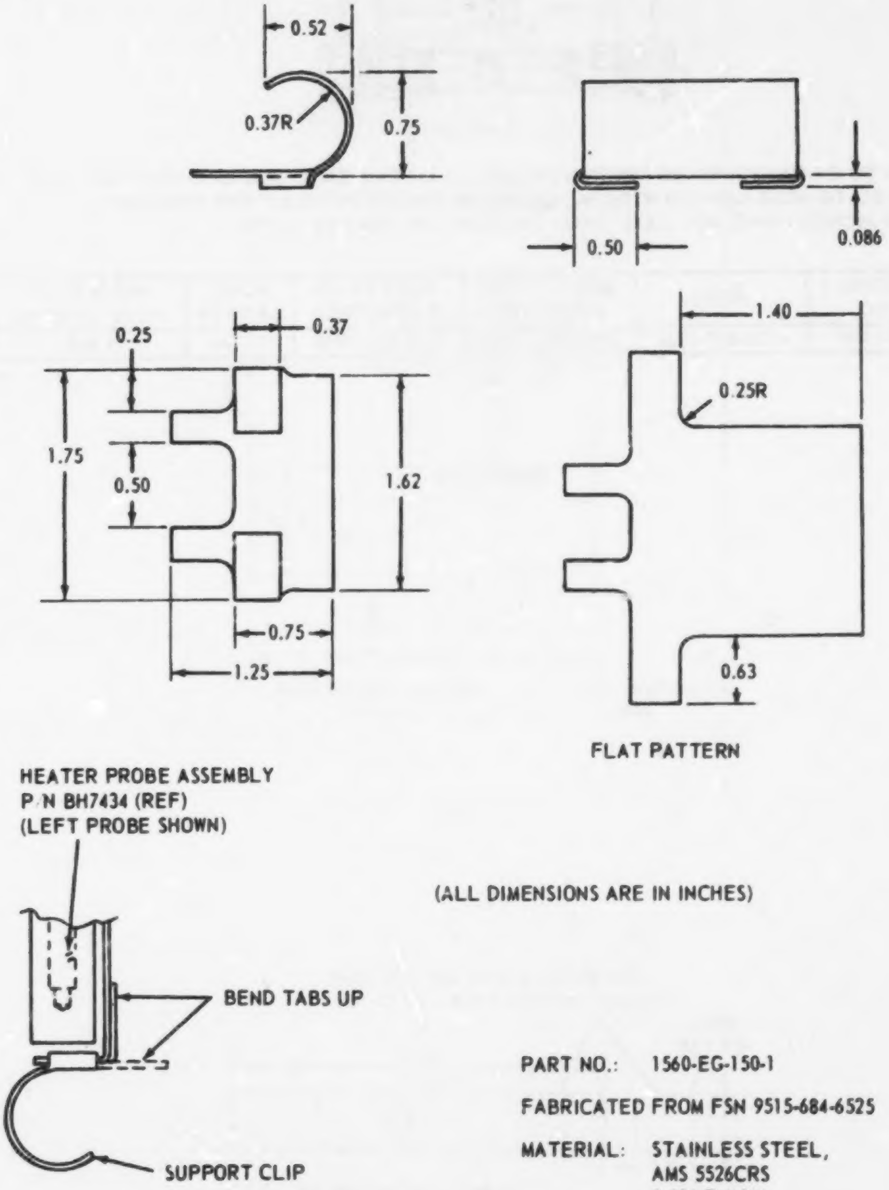


LENGTH TO BE MEASURED BETWEEN CENTERS OF NIPPLE ENDS ALONG A STRAIGHT LINE PARALLEL TO HOSE LENGTH WITH HOSE LAID OUT HORIZONTALLY AND STRAIGHT. 12 TO 18 INCHES LONG, NOT LESS THAN 1/4 INCH (TOLERANCE ± 1/8)

HOSE ASSEMBLY PART NO.	HOSE	END FITTING 2 REQUIRED	DUST PLUG 2 REQUIRED	HOSE LENGTH	ASSEMBLED HOSE LENGTH
MS8000K140G	4720-857-1734	4730-935-9382	5340-833-7039	11.740	14.000

AV 081089
XA-834

Figure C-3


0.52
0.37R
0.75
0.50
0.086
0.25
0.37
1.75
0.50
1.62
0.75
1.25
1.40
0.25R
0.63
FLAT PATTERN
HEATER PROBE ASSEMBLY
P/N BH7434 (REF)
(LEFT PROBE SHOWN)
BEND TABS UP
SUPPORT CLIP

(ALL DIMENSIONS ARE IN INCHES)

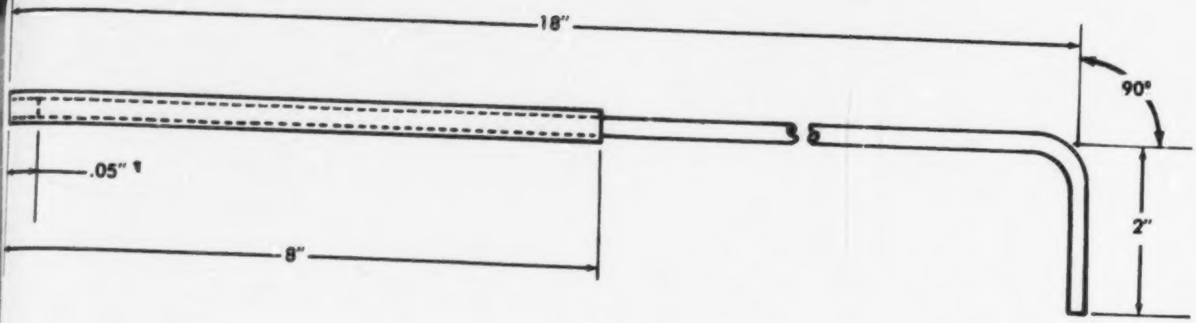
PART NO.: 1560-EG-150-1

FABRICATED FROM FSN 9515-684-6525

MATERIAL: STAINLESS STEEL,
AMS 5526CRS
0.025 THICK

AV 081139
XA-854

Figure C-4



NOTE:

DRAIN TUBE EXTENSION BEYOND END OF TUBING NECESSARY FOR COMPRESSOR BLADE PROTECTION.

QTY REQD		NOMENCLATURE OR DESCRIPTION		PART OR IDENTIFYING NO.	SPECIFICATION	N.S.N.
1		DRAIN TUBE	⅜ DIA.	2		4710-00-933-4416
1		TUBING	¼ DIA.	1	MIL-T-8606	4710-00-580-6126

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
.X = ± .1
ANGLES ± 5°

Figure C-5

APPENDIX D

REPAIR PARTS AND SPECIAL TOOLS LIST

(Not Applicable)

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By Order of the Secretary of the Army:

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